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CARCINOMA OF THE LARYNX

RESULTS OBTAINED BY SURGERY AND EXTERNAL RADIATION IN NINETY-THREE CASES

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Factors that might affect the prognosis in carcinoma of the larynx have been studied in 93 patients treated not less than five years ago. The patients were classified with respect to both the stage of the disease and the location of the lesion. These factors to some extent influenced the choice of treatment, which was either by surgery or by radiation. (Supervoltage was not used in this series.) Comparisons were therefore difficult. In 65 of the 93 cases the lesion was at the glottis, and 37 of the 65 glottic lesions were classified as stage 2 (carcinoma infiltrating but not extending beyond larynx, mobility of larynx impaired or lost, no nodes palpable). Of the 37, 25 (68%) survived five years or more. On the basis of experience with glottic lesions in stage 1 and early stage 2 it is concluded that this group may safely be treated primarily by external radiation, provided that a careful follow-up can be assured.

NINETY-THREE cases of carcinoma of the larynx treated before Dec. 31, 1952, are the subject of this review. The observation period was a minimum of five years except for those patients who died and those who were lost to follow-up. The latter amount to 3%. When it has been impossible to trace the patient, it has been presumed that he or she died of the disease. The report comprises all patients treated, including those who received only palliation.

These 93 cases have been classified and staged in accordance with the methods suggested by the international committee for stage-grouping in cancer and for the presentation of the results of treatment of cancer (referred to as ICPR) [1] in Copenhagen in July, 1953, with only one minor modification. Classification of the anatomic sites of carcinoma of the larynx are the supraglottis, glottis (vocal cords), subglottis, and borderline areas.

The lesions occurring in the borderline area "arise at or near the upper border of the larynx in which on examination it is impossible to state accurately whether the original lesion began within or without the larynx. Such lesions should be in-

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cluded with the pharyngeal carcinoma."[1] Lederman,[2] giving sound reasons, has suggested that the epiglottis be divided into infrahyoid and suprahyoid portions; growths involving the suprahyoid portion should be considered epilaryngeal tumors of the pharynx. Thus the supraglottic area includes the ventricle, ventricular fold, and infrahyoid portion of the epiglottis. This puts a more definite limit to the supraglottic area and should reduce the number of cases being placed in the borderline group.

TABLE 1.—*Survival Rates in Carcinoma of Larynx According to Classification*

Classification	No. of Cases	5-Yr. Survival No.	5-Yr. Survival %
Supraglottic	27	10	37
Glottic	65	43	66
Subglottic	1	1	100
Totals	93	54	59

Clinical stages in carcinoma of the supraglottis, glottis, and subglottis (ICPR) are stage 1, carcinoma limited to the mucous membrane, full mobility of the larynx retained, no nodes palpable; stage 2, carcinoma infiltrating but not extending beyond larynx, mobility of larynx impaired or lost, no nodes palpable; stage 3, carcinoma extending beyond larynx, or nodes palpable but movable; and stage 4, involvement of skin, or nodes fixed, or distant metastases present.

In this series surgery has consisted of biopsy excision, laryngofissure, laryngectomy, and radical neck dissection of metastatic nodes. In only one case was biopsy excision performed, and this gave five years' freedom from disease before recurrence appeared. The only other conservative procedure used was laryngofissure; hemilaryngectomy and other modifications were not performed. Prophylactic neck dissection had not been employed up to December, 1952. In those patients with neck metastases, the dissection was performed along with the laryngectomy; in only one case was it deemed necessary to perform bilateral neck dissection as primary treatment, and the second side was dissected three weeks after the first operation.

Radiation

Since early in 1953, it has been our practice to use supervoltage radiation and more than 30 patients have been so treated. Our impression is that the long-term results may be slightly better. Furthermore, there is less skin reaction and less difficult surgery when radiation fails. Mucositis is equally severe and, of course, has to be; otherwise, it is obvious that not enough treatment has been given or that the rate of administration has been too slow. The dose is about 6,000 r to the tumor in 42 days with 2 Mev.

The method of treatment at 250 kv., as used in the discussed cases, was with bilateral directly opposed fields which ranged in size from 4 by cm. to as large as 6 by 8 cm., depending on the extent of the lesion. The smallest field possible was used, and in the later years plaster jackets were used along with special devices for accurately aiming the beam of radiation. More important was the making of films to demonstrate the location of the treatment portal. The earlier patients were treated lying down, but as the special devices came to be used the patients were seated in a special chair which gave better immobilization and day-to-day accuracy. Most of the later patients received a more standardized treatment consisting of a tumor dose of 5,000 to 5,500 r in 35 to 42 days. This dose falls within the range of time-dose relationship found to be best by other workers.[3] The radiation was at first 200 kv., half-value layer 1.5 mm. Cu; but since 1950 we have used 250 kv., half-value layer 3 mm. Cu. Treatment distance was 50 cm. in most cases, but occasionally for individuals with very thick necks 80 cm. was employed. Skin reactions were severe as would be expected, and most patients developed a wet dermatitis.

During treatment the patients were carefully observed by both radiotherapist and otolaryngologist and followed at frequent intervals thereafter by both services. The joint management of these cases has been found to be a distinct advantage for all concerned.

Results

As can be seen in table 1, 70% of the lesions originated in the vocal cords and 29% in the supraglottic area. There was only one subglottic case which was in stage 2 when laryngectomy was done. It will be noted that the over-all five-year survival rate in the supraglottic group is 37% and in the glottic 65%.

In table 2, it is seen that more than 60% of the supraglottic cases were in stage 3 when diagnosed and there were no stage 1 cases, confirming the view that many patients with supraglottic lesions are asymptomatic for a long period, unlike those patients with glottic lesions where hoarseness is a complaint relatively early. The 37% over-all five-year survival rate is made up of 4 survivals out of 9 stage-2 cases, 6 out of 16 stage-3 cases, and none out of 2 stage-4 cases.

TABLE 2.—*Survival Rates in Supraglottic Carcinoma of Larynx According to Stage*

Stage	No. of Cases	5-Yr. Survival No.	5-Yr. Survival %
1	0	0	0
2	9	4	44
3	16	6	38
4	2	0	0

Table 3 shows that surgery as the primary form of treatment gave superior results in stage-2 supraglottic lesions. The two patients who failed to respond to radiation were later subjected to laryngectomy and one of them survived five years. Again

in stage-3 supraglottic lesions it would appear that surgery offers a better chance of five-year survival than does radiation. Those patients who had primary radiation were later subjected to surgery.

TABLE 3.—*Survival Rates in Supraglottic Carcinoma of Larynx According to Therapy*

	Stage 2			Stage 3		
		5-Yr. Survival			5-Yr. Survival	
Treatment	No. of Cases	No.	%	No. of Cases	No.	%
Surgery	4	3	75	4	2	50
Radiation	5	0	0	11	2	18
Radiation failure	(2)	1	50	(3)	1	33
Radiation failure elsewhere				1	1	100
Total	9	4	44	16	6	38

Included in the table is one patient who had received radiotherapy at another institution. The two patients with stage-4 supraglottic lesions failed to live one year.

Whereas surgery gave a five-year survival rate of 80% in glottic stage 1, radiation as primary form of treatment only achieved 70%, but one of the failures was salvaged by surgery, bringing the percentage of five-year survival up to 80% for the 20 cases in this group. In this small number of cases, however, there is no practical difference between the results obtained by primary surgery and primary radiation (table 4).

On examining the results obtained by surgery and radiation in glottic stage 2 we find that primary surgery gives a slightly better five-year survival rate than radiation does. However, if the four cases which were salvaged by surgery after failing radiation are added to the seven radiation five-year survivals, we find that 78% of patients receiving primary radiation gain five years free of cancer.

The relatively low five-year survival rate with surgery is accounted for by the policy that has been practiced in the University of Chicago Clinics, namely, many of the patients with early stage-2 cases (those with diminution of movement of cords) are treated by primary radiation, whereas those with definitely fixed cords are subjected to laryngectomy. The survivals obtained would suggest that nothing is lost by this policy and that many patients avoid the mutilation of laryngectomy while others retain the larynx for a few years before coming to surgery.

Included in the stage-2 glottic group are five patients who had failed to respond to radiation elsewhere. Obviously it is impossible to satisfactorily classify and stage these patients after treatment has been given. However, there was no choice but to view them as presenting for treatment for the first time. It is seen that three out of five gained a "cure."

In glottic stage-3 cases, it is noted that surgery gave a better five-year survival than radiation. One patient with stage-4 glottic lesions survived five years after radiation followed by surgery.

Comment

Although each of the groups of cases is small and unsuitable for statistical analysis, certain impressions have been gained as to the place of surgery and radiation as primary forms of treatment in carcinoma of the larynx.

In the supraglottic group of cases radiation did not appear to offer as good a chance of five-year survival as surgery, even though some failed radiation cases can be salvaged by delayed surgery. The cure rate of the combined therapy was considerably lower than when primary surgery had been carried out.

This is not surprising when we consider that Bocca [4] found in 500 cases of laryngeal cancer that the incidence of cervical metastases was 51% in supraglottic lesions. Ogura and Bello [5] found that, out of 18 prophylactic neck dissections, in seven cases there was histologically demonstrable involvement of the lymphatics, in five other cases laryngectomy with radical neck dissection was performed after external radiation, and tumor was found in the nodes on three occasions.

There is, therefore, a high incidence of cervical metastases in these supraglottic lesions, and, furthermore, the involvement of these nodes may not be clinically detectable. Most clinicians are agreed that external radiation has little effect on cervical metastases.

It is, therefore, not surprising that external radiation as a primary form of treatment is not likely to be successful in the supraglottic lesions except in the very early stages. A similar argument can be put forward for surgery as the choice of treatment in all but early subglottic lesions.

It is apparent from the figures presented and from the work of others that there is little difference in the results obtained by surgery and radiation in the stage-1 glottic lesions. The average figure for five-year survival in the group is about 85% whether treatment is by surgery or by radiation.[6]

TABLE 4.—*Survival Rates in Glottic Carcinoma of Larynx According to Therapy**

	Stage 1			Stage 2			Stage 3		
		5-Yr. Survival			5-Yr. Survival			5-Yr. Survival	
Treatment	No. of Cases	No.	%	No. of Cases	No.	%	No. of Cases	No.	%
Surgery	10	8	80	19	11	58	2	1	50
Radiation	10	7	70	13	7	54	5	0	0
Radiation failure	(2)	1	50	(5)	4	80			
Radiation failure elsewhere				5	3	60			
Total	20	16	80	37	25	68	7	1	16

* One patient in stage 4 survived five years after radiation followed by surgery.

Primary radiation therapy in stage-1 lesions has the advantage of preserving a better voice and, furthermore, lesions can still be subjected to surgery before the disease has progressed beyond stage 1 or early stage 2.

There is a difference, however, between the two forms of treatment when applied to glottic stage-2 cases where the choice lies between radiation and laryngectomy rather than a conservative surgical procedure. Surgery gives a better five-year survival rate. Our surgical five-year survival figure is lower than it was three years ago. This undoubtedly results from the type of case treated. Only those with fixed cords have been subjected to primary surgery (laryngectomy) whereas those cases in which the cord movement was diminished but the cord not fixed—what might be termed early stage 2—have been subjected to radiation. Though the primary radiation five-year survival may be worse, when the cases salvaged by operation are added the survival figure equals that obtained when operation is the primary form of treatment.

By subjecting the patients with early stage-2 cases to radiation first and reserving operation for case of need, in some the mutilation of laryngectomy has been avoided and in others the larynx has been preserved for a number of years before operation is necessary. This form of therapy demands a most careful follow-up to insure that residual tumor or a recurrence be detected early.

On the basis of these findings the following principles of treatment would appear to be warranted: Patients with supraglottic and subglottic lesions should be subjected to primary surgery except those in stage 1. This operation should include bilateral neck dissection. We feel that stage-1 cases should be offered external radiation as primary treatment. Patients with stage-1 and early stage-2 glottic lesions should be treated primarily by external radiation, provided that a careful follow-up can be assured. Operation should be used in late stages 2, 3, and 4. Bilateral neck dissections should be used in stages 3 and 4 or where there is evidence of subglottic or supraglottic extension.

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ESSENTIAL MEDICAL SUPERVISION IN ATHLETICS FOR CHILDREN

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Essential medical supervision of children in sports consists of making sure that the child is fit for the sport in which he or she is to participate and of seeing that the child remains fit during the period of participation. The School Health Committee of the State Medical Society of Wisconsin[1] has expressed it succinctly: "careful medical evaluation prior to athletic participation, with continued medical supervision and guidance during the training and competition." The amount of medical supervision and guidance required depends on the type of athletic program in use. In general the

The physician called on to judge a child's readiness for a given form of athletics must understand both the sport and the child. Certain contact sports, especially when competition is intense, are too severe for immature boys. Puberty is one criterion for maturity, but the best basis for advice regarding participation in sports is examination by the physician, in his office, at regular intervals from infancy. On this basis the physician can do much to insure the proper choice of sports and to protect the child from injury and exploitation. Cooperation between physician and coach is important to this end.

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more highly competitive the program and the more body contact involved, the more urgently is medical supervision needed.

The need for and value of preparticipation examinations seem obvious. Often such examinations are made by several physicians in assembly-line fashion. In many instances this is considered the only way they can be carried out. This type of appraisal is better than none, yet it can scarcely be termed "careful medical evaluation." The physician in his office can better evaluate a child's readiness for a sport. In fact, the physician's best basis for advice regarding participation in sports is examination at regular intervals from infancy.

The physician should try to assess the child's physiological maturity so that he can help decide whether the youngster will be able to hold his own in the proposed sport. No accurate test or measure is available for this purpose, but rough estimates can readily be made. With high school boys the degree of development of pubic hair is often a helpful indication.[2] Children who are obviously immature should not be allowed to compete against the more mature, regardless of the equality of their ages. Age and weight are of some value in determining equality of competition, but a maturing youngster 12 or 13 years of age may outperform a less mature 14-year-old, even though the two are of equal weight.

Children who are poorly coordinated or physically handicapped in other ways should be encouraged to participate in athletic programs commensurate with their abilities, in which they should compete with others of approximately equal ability. The physician's responsibility is to advise the coach or physical director of the activities in which such a child may be allowed to participate.

Tests of the degree of conditioning may be of some value if properly used. They will probably be found to be most helpful among those who are in the more highly competitive sports in senior high school, but they may be used for younger children as well. The step test[3] is perhaps the simplest and best to use. Of course, athletic activities should not so engage the time and energy of a child that he is not fit for other activity.

Injuries occur in sports, most often in those involving contact. It is the duty of the physician to understand the dangers of the sport so that he may counsel the child and his parents regarding participation. This does not mean that a protective shield is to be thrown around the children of America, but it does mean that if enjoyment and development of skill and physique can be provided by two sports programs in equal degree, the one attended with fewer injuries is the more desirable. However, as has been pointed out by others,[4] "All life is risk and without courage life is not worth living." It is desirable for a high school boy capable of taking part in a well-conducted program of football[5] or other sports to do so in spite of some calculated risk. A fractured bone may leave less of a scar than a personality frustrated by parental timidity over allowing a boy to take part in a contact sport. Certain contact sports combined with intense competition, however, are too severe for immature boys.

Survey of Literature

There is remarkably little factual material published on the injury rate among children engaged in various sports. Studies such as those Thorndike[6] has made of Harvard football players, McPhee[7] of Princeton players, and Condon[8] of Boston College athletes should be carried out among high school, junior high, and younger players. Some information on high school players was obtained in 1949 by a three-state study in Minnesota, Wisconsin, and Michigan.[9] Another study, by Hibbert,[10] disclosed that one of five participants in football sustained an injury and that of those injured one in five (one of every 25 engaged) had a fracture. Both these studies show that the greener the lad, the higher the percentage of injury. The highest injury rate is among those less than 18 years of age.

Some effort is being made to collect data on the children who play football in the various Pop Warner Football Leagues.[11] The data thus far available indicate that most of the more severe injuries are fractures or epiphysial separations. Other studies on children have been carried out, but the results are in unpublished theses and in journals not available to most physicians. As more states adopt insurance schemes to cover high school athletes, additional information will be collected for study. This, however, will represent only the more severe injuries of adolescents and postadolescents. The lesser injuries also should be tabulated. Lowman,[12] indeed, has stressed the incipient injury, "the minute day-after-day trauma of the growing skeleton," the results of which may not be evident for several years. It is obvious that this type of injury will continue to be difficult to recognize and evaluate.

Recently the effect of exertion and sport activity on renal function has been studied.[13] It was thought initially that the hematuria observed among football players was due to the contact nature of the sport. The Duke study, however, demonstrates that it can occur among swimmers also. The extent to which hematuria occurs among elementary school athletes has never been studied, nor has the significance of exertionally induced hematuria been determined. Does transient hematuria mean renal damage, or does it indicate only a transient aberration of function?

Although football, as the most widely played contact sport in this country, has been the one most widely investigated, the injuries which occur in other sports such as baseball, track, lacrosse, soccer, ice hockey, basketball, and wrestling should be studied also. A report regarding the injuries sustained by those participating in Little League baseball is soon to be published.[14] Much other work remains to be done, particularly among children of junior high and upper primary school age. Injuries among these groups remain among the unknowns of competitive athletics for children.

Those who have written about injuries sustained through participation in athletics have correctly pointed out the need for medical supervision of injuries incurred not only during the games but also during practice sessions. While this extension of supervision may be difficult, if not impossible, for many senior high school, junior high school, and elementary school athletic teams, it nevertheless is a goal toward which we should aim. Both Thorndike[6] and Reichert[15] have pointed out that the eager competitor often tries to hide an early injury. Failure to detect and treat early injury results frequently in prolonged convalescence or permanent injury.

Intercurrent infections, respiratory infections, gastrointestinal upsets, and contagious diseases strike the athlete as well as the nonathlete. It is the duty of the physician and not the coach to decide when the boy who has had either an injury or an illness may return to playing. Ample opportunity particularly should be allowed for the child to recover fully after a streptococcic infection.[16]

Most articles concerned with children's athletic activities concern boys alone. Girls also take part in athletics, and they also need medical supervision. Customarily their sports activities are less strenuous and less intensively competitive than boys' sports, and they seldom engage in body contact sports. Preparticipation examination, however, is important for girls as well as for boys. Furthermore, the physician may be asked to decide on the suitability of certain sports for girls.

Professional Responsibilities

Many of us in medicine are sports fans, and some of us are still players. Yet we should not allow our sports enthusiasm to overpower the need to keep athletic programs in proper perspective. As physicians, we must remember that while an athlete must be fit to be a good competitor, competitive athletics are better viewed as a means of keeping fit. Athletics should be a means to an end, not an end in themselves. A few children are endowed with the mental and physical abilities which make a great athlete. Such a child, like the intellectually gifted child, must be guided properly so that he makes the most of his abilities. He must not be exploited.

Joint meetings of doctors and physical educators, such as the Indiana Conference of Physicians and Coaches in 1957,[17] are very valuable. Cooperation between doctors and physical educators locally and between organizations of each group at state and national levels will do much to insure the proper choice of sports for children of the various age groups, proper matching of adolescents and children in competition, adequate medical supervision, and a better program of fitness for the youth of our country.

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ROLE OF EXFOLIATIVE CYTOLOGY IN THE DIAGNOSIS OF CANCER OF THE DIGESTIVE TRACT

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The diagnostic method of exfoliative cytology has been applied to lesions in the esophagus, stomach, duodenum, pancreas, bile ducts, and colon. The present study concerns the frequency with which the diagnosis of cancer, confirmed by subsequent findings, was anticipated by microscopic examination of cells obtained by lavage. The most difficult area was the duodenum, but malignant cells were recognized in 33 out of 55 cases in which cancer was primary or metastatic in the duodenum or existed in the pancreas or biliary system. In 95% of a large number of cases of cancer of the esophagus, stomach, and colon the results of exfoliative cytology were positive. False-positive results were infrequent with reference to esophagus, stomach, and duodenum and did not occur with reference to the colon. In 38 proved cases of cancer of the colon, cytological diagnosis was positive in 36 instances.

Sufficient time has elapsed to permit critical evaluation of the diagnostic possibilities of exfoliative cytology in cancer of the gastrointestinal tract. The purpose of this paper is to present the results obtained with this technique in the four major areas, namely the esophagus, the stomach, the pancreas and biliary systems, and the colon. The technical aspects consist of a succession of simple steps and techniques performed systematically, as previously described.[1] Discrepancies in the routine of collection or in interpretation will reduce the value of the examination. Exfoliative cytology, when properly used, ranks second only to direct biopsy of the lesion in accuracy and reliability in the diagnosis of cancer.

Major Areas

Esophagus.—The esophagus is the easiest and most direct organ to study cytologically [2] and yields the highest percentage of correct positive diagnoses. Of 151 patients examined, 69 had esophageal carcinoma; in 66 of these (95%) a diagnosis of malignancy was established preoperatively. The roentgenologic examination was strongly suggestive or diagnostic of carcinoma in 55 of the 69 cases. Of the 82 patients without cancer, the results of the cytological examination were negative in 80 and false-positive in 2.

Rarely are basal cell or epidermoid (squamous cell) carcinomas difficult to diagnose. In one of three patients with cancer in whom the diagnosis was not established cytologically, the x-ray examination disclosed a midesophageal stricture. Extremely well differentiated malignant cells were seen in the lavage but were not recognized as such until compared with cells obtained at the postmortem scraping of the lesion. The second false-negative result was of an adenocarcinoma of the distal one-third of the esophagus from which several cells suggestive of malignancy were obtained; the patient was recalled for a reexamination but experienced a myocardial infarction before he could return. The third false-negative diagnosis was of a squamous cell neoplasm which apparently failed to penetrate the mucosal surface and hence did not exfoliate malignant cells. Esophagitis with leukoplakia has been the only disease which has produced a problem in interpretation. In two patients with this disease, one with cardiospasm, malignant-appearing but nevertheless benign cells were exfoliated in small numbers and falsely interpreted as malignant.

Stomach.—The stomach is the most frequently examined organ. We have studied 871 patients since April, 1955, 131 of whom were eventually proved to have gastric adenocarcinoma [3] or lymphoma.[4] A correct cytological preoperative diagnosis was made in 125 of the 131 patients (95%). Of the 740 patients without cancer, the results of the cytological examination were negative in 736, false-positive in 4.

Pathognomonic cells were found in all seven cases of lymphosarcoma; reticulum cell sarcomas were recognized in two of the three patients. One leiomyosarcoma did not exfoliate pathognomonic cells. It is important to note that satisfactory examinations were performed in all but 10 of the 871 cases. Obstruction and retention due to duodenal ulcer was the most frequent cause of an inadequate examination.

Benign gastric ulcer in the healing phase occasionally exfoliates an interesting and confusing cell whose increase in size and chromatin condensation is suggestive of malignancy. We have looked on these abnormal atypical cells, perhaps naively, as

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the mucosa's attempt to breach the ulcer defect with immature columnar cells. In treated pernicious anemia [5] the gastric mucosa exfoliates a macrocytic bland columnar epithelial cell; during relapse a bizarre cell indistinguishable from gastric cancer is often found. Mucinous goblet cells are seen with atrophic gastritis (colonization of the mucosa), with benign gastric polyps, and occasionally with gastric cancer. After irradiation, the stomach will exfoliate for several weeks a large number of cells with many morphologic features of malignancy. In the single instance of a benign papilloma encountered, interesting "tumor cells" were obtained which lacked the typical nuclear clumping of malignancy. Benign granulomas may exfoliate multinucleate histocytic giant cells, but benign leiomyomas do not slough characteristic cells.

We failed to diagnose 6 of 131 adenocarcinomas and sarcomas of the stomach; these are recorded as false-negative examinations. The most likely causes for failure seem to have been improper positioning of the gastric tube, inability to identify a few malignant cells, reepithelialization of a malignant ulcer base (two cases), and failure of a minute submucosal carcinoma to penetrate the surface. Of 740 patients with benign gastric conditions only 4 (0.5%) were given an erroneous cytological diagnosis of malignancy (false-positive report); in all four instances, pathological processes in the stomach or duodenum were found at surgery. In three of these patients healing duodenal ulcers apparently exfoliated small numbers of malignant appearing cells which entered the stomach by reflux during the gastric lavage. Scant information is available on the exfoliation of healing duodenal ulcers; it is interesting that, in our experience, this is the most common cause of misinterpretation. In the fourth patient, multiple shallow healing ulcers of the lesser curvature of the stomach were present, which on histological examination were found to contain the same abnormal prototype cell observed in the gastric wash.

A comparison of the accuracy of cytological diagnosis with the roentgenologic interpretations is of considerable clinical importance.

TABLE 1.—*X-ray versus Cytological Diagnosis in 131 Cases of Gastric Cancer*

	X-ray		Cytological	
	No.	%	No.	%
Cancer	81	61	125	95
Inconclusive	27	20	0	0
No cancer	23	19	6	5

In the 131 proved malignancies, the x-ray report was definitely positive in 81 cases (61%). In the remaining 50 patients, (39%), the x-ray examination was reported as normal in 23 and as benign or questionably benign in 7 with ulcers and in 20 with miscellaneous conditions. Malignant cells were recovered by lavage in all 27 of these patients. It is evident that the diagnostic accuracy of the technique of exfoliative cytology is higher than that of x-ray examination, but it must be admitted at the same time that the procedure cannot be used for large-scale screening because of the time required for examination. Hence, in a sense, the two methods are complementary and additive; since the x-ray examination is easier, the cytological study may be held in reserve to be used when more precise information is needed.

It always has been our opinion that a report of cytological findings with such phraseology as "atypical," "abnormal," or "grade III or IV" contributes to confusion. We report only "positive for malignant cells" or "negative for malignant cells." If abnormal or unidentifiable cells appear in a gastric wash we repeat the examination with a most vigorous lavage. This second wash will almost always resolve the issue. In all cytologically positive cases, we have found some malignant cells on the first wash; when few in number or not well preserved a second lavage has produced abundant neoplastic cells. Similarly, our experience has been that, when one is not quite certain of the origin of atypical cells, a second wash will often yield additional cells readily recognized as benign. Thus a majority of the problems can be resolved with a second lavage.

Pancreatic and Biliary Systems.—The pancreas and biliary tract have been the most challenging and intriguing regions for the cytologist.[6] Not only is the duodenum a most remote area to reach but the exfoliation of cells is scanty and the cytological interpretation is more difficult. A rapid method of intubation has been described by us elsewhere.[7] The availability of safe purified and standardized secretin undoubtedly has increased the accuracy of the examination. Tumors limited to the body of the pancreas can be detected by increased pancreatic secretion through stimulation with secretin; it is unlikely that these malignant cells would be recovered by nonhormonal drainage.

In 356 duodenal drainages performed since April, 1955, 55 proved carcinomas have been encountered: pancreas, 43; bile duct, 7; gallbladder, 1; carcinoma of the duodenum primary, 2; and metastatic, 2. Malignant cells were recovered in 33 (60%) of the 55 patients.

TABLE 2.—*Duodenal Cytology*

	No. of Patients	Cells Found
Pancreas	43	25
Bile ducts	7	3
Gallbladder	1	1
Primary duodenal	2	2
Metastatic duodenal	2	2
Total	55	33

The series includes three carcinomas of the head of the pancreas, and one of the left hepatic bile duct, in which at the time of operation the surgeon was

unable by palpation and biopsy to locate the neoplasms. Surgical diagnoses were made of chronic pancreatitis in three instances and cirrhosis of the liver in the fourth. All four individuals died within six months or less, and all had carcinomas proved by either autopsy or liver biopsy.

Of the 301 patients without cancer, the results of the cytological examination were negative in 299, and 2 false-positive examinations were made in patients with cholesterosis of the gallbladder (1) and a healing duodenal ulcer (1) which exfoliated cells morphologically compatible with malignancy.

Colon.—Colonic cytology has been utilized for the detection of tumors above proctoscopic range.[8] Of the 183 examinations performed, 145 were negative clinically and cytologically. Of 38 clinically proved colonic malignancies, the cytological examination was positive in 36.

Of the two false-negative examinations, one was of a carcinoma in situ in a polyp of the descending colon; the other patient with a lesion in the middle of the descending colon had received castor oil unknown to us two hours before the examination, producing excessive fecal contamination of the wash. This test should have been declared unsatisfactory and repeated. An additional 11 patients have not been included in the series because the preparation of the intestine was technically so unsatisfactory that no report could be rendered.

In 10 of the 36 patients with positive cytological findings, the initial barium enema failed to make a diagnosis of carcinoma; in 5 of the 10 the result of the first roentgenologic examination was reported as normal. Only with knowledge of the positive cytological findings was the radiologist successful in the subsequent demonstration of these small tumors. The other five patients with roentgenologically unrecognized colonic cancer had diverticulitis, benign polyps, or ulcerative colitis.

TABLE 3.—*X-ray versus Cytological Diagnosis in Thirty-eight Proved Cases of Cancer of the Colon*

	X-ray		Cytological	
	No.	%	No.	%
Cancer	28	74	36	95
Inconclusive	5	13	0	0
No cancer	5	13	2	5

The epithelium of the colon is not as complex morphologically as that of the stomach. Therefore, with the exception of ulcerative colitis,[9] great variations and gradients of cell structure are not encountered. Malignant cells are more readily recognized in this area than anywhere else. We have had no false-positive examinations to date.

Comment

In the past three years, in the examination of 1,561 patients, including 293 with gastrointestinal cancer, by the technique of exfoliative cytology, the diagnostic accuracy of the procedure for the various portions of the digestive tract has been as shown in table 4. We conclude that exfoliative cytology is

TABLE 4.—*Accuracy of Results of Cytological Examination of 1,561 Patients*

Area	No. of Cancers	Cells Found	Accuracy, %
Esophagus	69	66	95
Stomach	131	125	95
Duodenum	55	33	60
Colon	38	36	95

applicable to all areas of the gastrointestinal tract as an accurate and definitive diagnostic procedure for the detection of cancer.

950 E. 59th St. (37) (Dr. Raskin).

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The secretin used in this study was supplied by Dr. James B. Hammond, Eli Lilly & Company, Indianapolis.

Cytotechnicians Miss Sylvia Pleticka, Mr. Willard A. Yarema, and Mrs. Penny Ford assisted in the cytological procedures.

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TREATMENT FOR COMMINUTED FRACTURES OF THE OS CALCIS

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Comminuted fracture of the os calcis frequently leads to prolonged disability. To prevent this, the reduction of the fracture must be accurate. The technique here illustrated involves the temporary insertion of a Steinmann nail into the part of the os calcis attached to the achilles tendon. This permits the application of tractions and thrusts in a way that elevates the depressed central articular fragment into its original position, restores the normal relation of os calcis to talus, and reduces the transverse spread of the fragments of the os calcis. After the cast has been applied, with the patient still under anesthesia, the nail is removed, and a program of postreductive treatment is carefully followed. Twenty-two patients so treated regained full motion of foot and ankle and have excellent function without dependence on any orthopedic appliances or other aids.

An analysis of the results of the treatment of comminuted depressed fractures of the os calcis leaves much to be desired. On the whole, the end-results are unsatisfactory. Much too often the patient ends up with a painful foot, limited in motion,

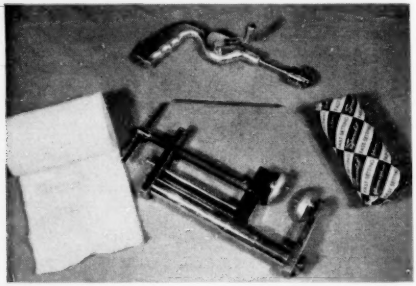

Fig. 1.—Drill bit, ¼-in. Steinmann nail, Böhler os calcis clamp, 6-in. sheet wadding, and fast-setting plaster for use in treatment of comminuted fractures.

in spite of prolonged treatment and loss of time. In many instances the patient is unable to return to his former occupation and settles for a less vigorous job, usually at less pay. This poses an important economic problem. The resultant permanent disability is due to an incomplete reduction of the fracture and is manifested by a bony block under the lateral malleolus due to a spreading of the os calcis, a pronated foot, and an irregular subtalar joint.

The problems in accurately reducing a comminuted fracture of the os calcis are (1) elevation and restoration of the depressed central articular fragment to its original position, (2) restoration of the astragalocalcaneal angle (Böhler's angle), and (3) reduction of the transverse spread of the os calcis. To solve this problem, I have developed a procedure which modifies the methods of Dr. Böhler and Sir Watson Jones [1] by a few original maneuvers. Figure 1 illustrates the material and equipment used, namely, a drill bit, a ¼-in. Steinman nail, a Böhler os calcis clamp, 6-in. sheet wadding, and fast-setting plaster.

With the patient under general anesthesia and in a supine position, the involved foot, ankle, and lower third of the leg are surgically prepared and draped. The surgeon and assistants are surgically dressed. An associate elevates the draped leg. The insertion of the achilles tendon at the os calcis is palpated, and a ¼-in. Steinmann nail is drilled into the os calcis at a 35-degree angle plantarward in

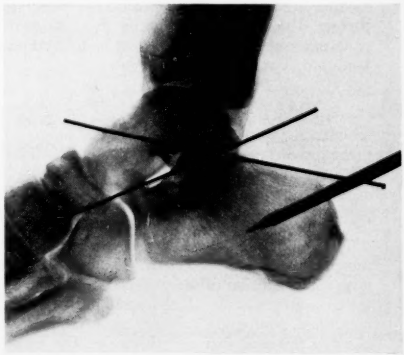

Fig. 2.—Lateral x-ray of foot, showing Böhler angle and angle and depth of insertion of Steinmann nail.

its axial plane. The depth of nail penetration is governed by the length of the posterior os calcis fragment as revealed by x-ray. Usually this is a

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distance of 1 to 1.5 in. Figure 2 shows lateral x-ray of the foot, illustrating the Böhler angle and the angle and depth of insertion of the Steinmann nail.

The drill bit is now removed and a sterile 4-by-4-in. gauze dressing is passed over the nail to firm contact with the skin of the heel. The surgeon now faces the plantar surface of the foot. The fingers of the right hand grasp the protruding Steinmann nail as the right thumb is placed on the plantar surface of the heel at the mid-portion of the os calcis. The fingers of the left hand grasp the dorsum of the foot at the tarsometatarsal junction as the left thumb is placed on the plantar surface of the foot in the midtarsal area. Figure 3 illustrates the position of the fingers of the right hand as it grasps the Steinmann nail and the position of the right thumb as it pushes upward on the plantar surface of the os calcis.

Plantarward lever-like traction is then applied to the nail and forefoot against the upward thrust of the right thumb as it is used as a fulcrum against

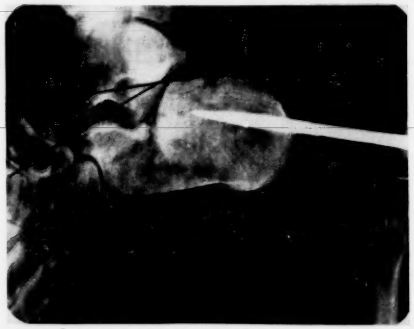

Fig. 3.—Position of fingers of right hand grasping Steinmann nail and of right thumb pushing upward on plantar surface of os calcis.

the body of the os calcis. The traction and thrust are maintained while an associate places the Böhler os calcis clamp against the medial and lateral surfaces of the os calcis and quickly compresses the sideward spread of the fragments until normal configuration can be palpated and free space is present under the external malleolus. The os calcis clamp must be released quickly in order to avoid devitalization of the already embarrassed skin. Traction and thrust on the forefoot, nail, and os calcis are maintained, while the associate encircles the limb from the toes to the knee with sheet wadding and then plaster. The traction is released at separate individual points only momentarily to allow for the passage of the sheet wadding and plaster. As the plaster is applied it is molded well about the os calcis and nail. All traction forces are maintained until the plaster hardens. Figure 4 illustrates the maintenance of all traction force while the plaster hardens.

When the cast is hard and with the patient still under anesthesia the Steinmann nail is removed with pliers by a gentle rotation of the nail in its long

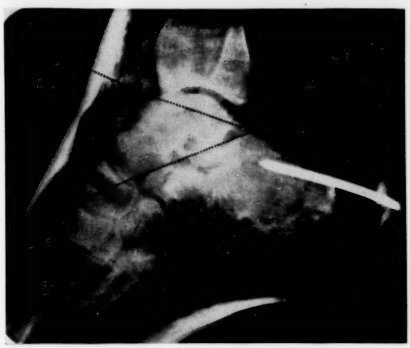

Fig. 4.—All traction force maintained while plaster hardens.

axis. Care must be taken to avoid rough handling of the nail in order to prevent manual displacement of the posterior fragment. Postreductive care is similar to that of any fresh fracture on which a circular cast has been applied. 1. Elevate foot and

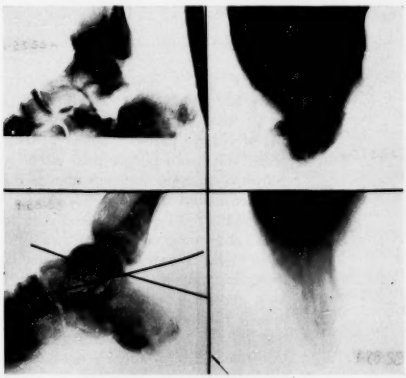

Fig. 5 (case 1).—X-rays showing fracture of os calcis at time of manipulation and three months later.

leg on pillows above the cardiac level for the first 24 hours. 2. Give medicaments for pain. 3. Observe the toes carefully for swelling and discoloration. 4. Bivalve the cast if necessary and then tape halves. If Webrill is used this may have to be split at the

time the cast is bivalved. 5. Promote early active toe motion, ambulation with crutches and non-weight-bearing. 6. Recheck x-rays at four-week intervals after postreductive films have been made. 7. Remove cast at 10 to 12 weeks post reduction, depending on the amount of callus formation. 8.

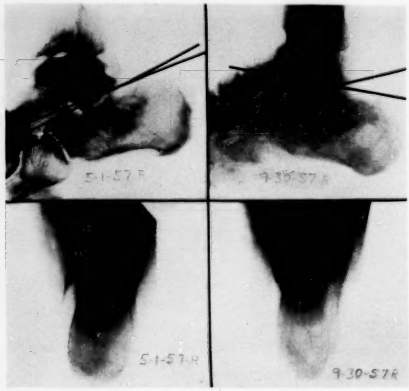

Fig. 6 (case 2).—X-rays showing fracture of os calcis at time of manipulation and five months later.

Apply regular shoe early. 9. Give physical therapy three times weekly for a period of six to eight weeks. 10. Permit graduated weight bearing at 14 to 16 weeks. 11. Permit full weight bearing and resumption of regular work at 18 to 20 weeks.

The results in the following cases are representative of those obtained in 22 cases in which this method was used.

Report of Cases

CASE 1.—A 44-year-old man (fig. 5) fell through a skylight, a distance of 25 ft., on June 23, 1955. The os calcis was manipulated on July 8, 1955. X-rays were taken again on Sept. 28.

CASE 2.—A 54-year-old man (fig. 6), weight 265 lb. (120.2 kg.), fell from a ladder, a distance of 8 ft., on May 1, 1957. Manipulation was done on May 7. The last x-ray, on Sept. 30, 1957, shows normal astragalocalcaneal angle and articular surface.

Comment

All of the foregoing patients were treated at the Little Company of Mary Hospital, and my associate was Dr. Fred Zeiss. Further, all of the patients have resumed their former occupations with a minimum of discomfort and are pleased with the result obtained. All patients have full motion of foot and ankle and are able to rise on their toes and walk on the lateral surfaces of their feet. None of them are wearing any orthopedic appliances or shoe lifts. Further, this method as described is simple, direct, and rapidly done, with control of all fragments at all times.

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RESPIRATORY INFECTIONS IN THE ELDERLY.—Infections of the respiratory tract are the most common cause of illness in all age-groups. Among elderly patients, however, they are potentially lethal. In fact, chronic bronchitis kills more people than either pulmonary tuberculosis or cancer of the lung. So often, a respiratory infection is the final complication which tips the precarious balance in old age. Many a patient with hypertension, cardiac failure or cerebral thrombosis has been stabilized until bronchitis supervenes. The necropsy findings of basal pulmonary edema with patchy consolidation are common terminal phenomena in so many chronic diseases of later life. Hence the prevention and treatment of the respiratory infections of the elderly are matters deserving careful attention from both general practitioners and specialists . . . After an acute respiratory illness, an elderly patient should be given adequate convalescence. While the bedfast state is bad for the aged, their myocardium takes time to return to normal after a chest infection. Slow, gradual rehabilitation is the rule, using a large comfortable armchair as a domestic gymnasium. The exercise of getting from bed to chair and back again can be of great benefit to the patient. Walking round the chair, with its back as support, is the first excursion to be permitted. Using the end of the bed to pull the body into an upright position is another valuable form of domestic gymnastics. Incidentally, a room temperature of 70 F (21 C) or more is desirable for both nursing and rehabilitation of old folk. Exposure to cold will undo much good work. —T. H. Howell, F.R.C.P. Ed., The Prevention and Care of Respiratory Infections in the Elderly, *The Practitioner*, December, 1958.

BASIC CONCEPTS ABOUT SHOULDER-ARM SYNDROME

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The shoulder-arm syndrome is a painful disability that sometimes follows a sprain, laceration, or simple fracture. Although the immediate cause may have been trivial, the patient continues to have a swollen, discolored, tender, painful, and functionless arm and hand. An accurate diagnosis must be made before treatment is begun, and the possibility that the patient has an incompletely reduced dislocation, ununited fracture, or neuroma must be excluded. If the diagnosis is correct, it will be confirmed by the relief afforded by injecting a short-acting anesthetic agent about the stellate ganglion on the same side as the disability. Such relief corroborates the diagnosis, makes it possible to start physical therapy on a previously painful limb, and indicates a good prognosis. The psychological complications of this syndrome are such that sometimes the special abilities of a psychiatrist are absolutely necessary for special and difficult patients. The structural and functional components of the condition must both be treated, and the best results are obtained by the physician who is most genuinely interested in the patient.

Shoulder-arm syndrome, sometimes called reflex sympathetic dystrophy, is a disorder characterized by dysfunction of the sympathetic nerves to an upper extremity. This syndrome has been recognized for a long time, and the literature on the subject is more voluminous than the accepted knowledge about it. Much remains to be explained about the details of the mechanisms involved in the syndrome, but in the searching for details sometimes the basic concepts about the disease have been overlooked. The purpose of this paper is to review some of these fundamental and practical concepts.

First, the shoulder-arm syndrome is a psychosomatic disease with an anatomic or physiological component and a psychological or psychiatric component. If treatment of the disease is to be successful both components must be treated.

Accuracy of Diagnosis

Second, before scientific treatment can be started, an accurate diagnosis must be made. Too frequently shoulder-arm syndrome is a "waste basket" diagnosis. When the patient fails to respond to the prescribed type of treatment his physician may be inclined to wonder if there is not perhaps a little element of sympathetic dystrophy associated with the original diagnosis. Before other diseases are ruled out, a course of nerve blocks or a series of physical therapy treatments may be arranged, all of which may be useless or even harmful if the patient has coronary heart disease or some other cause for the disability.

An accurate diagnosis of shoulder-arm syndrome is not made more often for two reasons; the diagnosis is difficult to make, and the efforts of the group of physicians usually involved in the treatment of the patient with this syndrome are not closely coordinated. The diagnosis is difficult to make because the signs and symptoms are not always characteristic, because there are few objective tests by which the diagnosis can be proved, and because the syndrome is almost always associated with other diseases and disabilities. Usually the diagnosis is made by elimination or exclusion of other factors that might be causing the patient's symptoms.

These difficulties in diagnosis are compounded by the fact that a single physician rarely follows a patient with shoulder-arm syndrome from start to finish. Frequently the treatment is prolonged and either the patient becomes discouraged and seeks new advice or the physician becomes doubtful and seeks consultation. The specialties most likely to be involved are surgery, internal medicine, anesthesiology, physical medicine, and psychiatry. For example, a patient gets a painful disability of an upper extremity, the cause of which may be serious but is more likely to be trivial, such as a sprain, laceration, or simple fracture. Appropriate treatment is given, and in due time the original disability is eliminated but the patient continues to have a swollen, discolored, tender, painful, functionless arm and hand. Then, either the surgeon or the anesthesiologist blocks somatic nerves in trigger areas, if such are present, or else blocks the sympathetic nerves. The physiatrist may be asked to rehabilitate the arm and hand, and the psychiatrist may be needed to rehabilitate the patient.

The accurate definite diagnosis of shoulder-arm syndrome is the primary responsibility of the surgeon and internist. They must rule out all possible

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pathology that might be causing the sympathetic dystrophy. It is not good practice to start a series of nerve blocks or physical therapy treatments only to discover later that the patient has an incompletely reduced dislocation, an ununited fracture, or a neuroma.

The services of the anesthesiologist, physiatrist, or psychiatrist are ancillary or auxiliary because theirs is a consultation practice. However, this does not relieve them from responsibility of confirming the diagnosis made or suspicioned by the surgeon or internist. Each consultant must question and be convinced of the accuracy of the diagnosis. As will be shown, the attitude of each physician is an important factor in the success of the treatment of shoulder-arm syndrome. The thoughts and actions of all the physicians on the team must be well coordinated by frequent thorough communications in order to avoid confusing the patient. Since confusion is one of the elements of the patient's disease, disorganization among his physicians could possibly "add fuel to the fire." When a patient is transferred from one physician to another it is necessary that all available information on the following subjects accompany the patient: complete diagnostic data, other diagnoses, past and current treatment, results of such treatment, and the explanations that have been made to the patient.

The most useful test in establishing the diagnosis of shoulder-arm syndrome is the injection of a solution of a short-acting anesthetic agent about the stellate ganglion on the same side as the disability. If the symptoms of the syndrome are relieved for the expected duration of the block, the evidence is good that sympathetic dysfunction contributes to the disability. If the symptoms are relieved for a longer time than the expected duration of the block, the prognosis is good that the physiological component of the syndrome will respond to a series of similar repeated sympathetic nerve blocks.

Treatment of Physiological Component

The third basic concept is that after the diagnosis of uncomplicated sympathetic dystrophy has been definitely and accurately made, the indicated treatment of the anatomic and physiological component is interruption of sympathetic nerve impulses to the arm involved. Just how this functional interruption of sympathetic nerves is effective is not completely understood, but, if the diagnosis is correct, there is little doubt but what it is helpful. It has been postulated that the original disability invokes an alarm reaction, one part of which is increased sympathetic outflow. In time this continued sympathetic outflow causes pathological changes in the arm and hand which act as a feed back mechanism for continued increased sympathetic outflow. If the sympathetic outflow can be blocked long enough and completely enough to allow the pathological changes in the extremity to heal, the cycle is broken and the patient recovers.

Several methods are available for breaking this vicious cycle. Sympathetic outflow may be interrupted by frequent injections of short-acting anesthetic agents, by less frequent injections of longer-acting anesthetic agents, or by surgical resection of the upper thoracic sympathetic trunk on the side of the disabled extremity. The technique used can be selected to suit the convenience of the patient, since each is effective provided the nerve block is sufficiently complete in degree and duration. Injections should be made in the same fascial plane as the sympathetic trunk at the level of the first thoracic vertebra or below. Injections made more cephalad may produce a Horner's syndrome without a sufficiently complete block of the sympathetic fibers to the arm to control the disease. The earlier in the course of the syndrome that sympathetic nerve interruption is accomplished, the shorter will be the necessary duration of treatment and the more successful will be the treatment. The pathological changes caused by long-standing sympathetic overactivity are corrected slowly and with difficulty.

Physical therapy can hasten resolution of the pathological changes in the extremity and is a valuable adjunct to sympathetic nerve blocks. Frequently the involved arm may be so painful and tender that adequate physical therapy cannot be accomplished. For these patients appointments should be coordinated so that physical therapy can be instituted immediately after the tenderness has been abolished or reduced by a sympathetic nerve block.

Treatment of Psychological Components

The fourth concept is that treatment of the physiological component of the disease alone is not sufficient. Even if arrangements could be made for two physicians of equal technical ability to use the same therapeutic procedure and produce identical physiological results, it would be possible for one to cure a majority of his patients while the other would cure only a few of his. The difference in results would lie in the fact that the successful physician treated the psychological component of the disease along with the physiological component, while the less successful physician disregarded the psychological component.

Directions for successful treatment of the psychological component are less definite and less easily outlined than are those for treating the physiological component. In general, the method of winning the patient's confidence must be varied to fit the personality of the patient. Some physicians seem to acquire this skill easily, but all can im-

prove their ability with thought and experience. Only three essential factors for successful treatment of the psychological component of shoulder-arm syndrome will be discussed—interest, sympathy, and encouragement.

Regardless of specialty, the successful physician must exhibit a personal interest in his patient. It is not sufficient for him to be interested only in the affected extremity and related pathology. He must be interested in the patient as a person. This type of interest can be manifested by conversations with the patient about the patient's general health, family, social life, hobbies, and even financial and economic problems. Once the proper physician-patient relationship has been established, it has been observed on occasion that the patient has developed a will to get well, not for the benefit that the patient himself would derive but because otherwise the good doctor friend would be depressed if his treatment was not successful. Such an extreme effect is rare but serves as an example of the powerful effect of an interest by the physician in the patient as a person and friend.

The necessity for sympathy on the physician's part carries the relationship a little farther. The physician must not only be interested in the patient but be sorry for the patient and be determined that the patient will be restored to good health. Sympathy must be genuine. The substitution of a feigned bedside-manner type of sympathy is quickly recognized by these patients who usually have had extensive experience with doctors, not all of it pleasant. Having been regarded as neurotics, drug addicts, and malingerers and passed from consultant to consultant like unsavory characters, they tend to become paranoid, suspicious, and critical. Unless the physician is fully convinced about the accuracy of the diagnosis, he will not be able to feel the necessary degree of sympathy for these patients.

When treatment becomes prolonged and progress is slow, the patient may become discouraged and need encouragement. He may develop personality defects which may have to be changed. Sometimes a will on the part of the patient to get well has to be developed. The disability may have come to be regarded as a haven from which the patient unconsciously fears to depart. The pain may be his means of getting the narcotics which he feels he cannot do without. If compensation for injury is being received, the patient may fear to lose this economic support. He must be convinced that he again is able to successfully compete in the struggles of everyday life. If encouragement to make this step toward accepting the responsibilities of a normal individual has to come from someone other than the patient, what source of encouragement is more logical than the patient's own physician?

Another psychological problem that may have to be overcome is the antagonism that the patient develops against his own painful arm. The biblical writer who advised "if thine right arm offend thee, cast it off" must have understood patients with shoulder-arm syndrome, because subconsciously some patients actually do just that. The offending arm comes to be regarded as something apart from the remainder of the body and may be regarded as an enemy of the body. Under these circumstances the physician's duty is to reestablish a friendly relationship between the patient and the patient's own arm. Even complete and continuous sympathetic nerve block will not effect rehabilitation if the patient persists in keeping the arm rigid, stiff, and functionless. However, if the tenderness and pain can be eliminated by nerve blocks, the physiatrist can encourage and persuade the patient to start using the arm to perform activities beneficial to the body. In this way the antagonism can be eliminated slowly, and encouragement becomes effective for subconscious readmission of the arm into the coordinated family of the organs of the body.

The psychiatrist is better trained to handle all these problems in the treatment of the psychological component of shoulder-arm syndrome than are the other members of the team of physicians. Sometimes his special abilities are absolutely necessary for the special and difficult patients. On the other hand, the surgeon and the internist and even the anesthesiologist and physiatrist have a golden opportunity of treating both somatic and psychic components of the disease simultaneously. By treatment of the physiological component and at the same time offering to the patient interest, sympathy, and encouragement, a favorable rapport can be established which may more than offset the scientific advantages of the psychiatrist. The physician who has earned the greatest degree of the patient's confidence is the one who is going to be most successful in treating shoulder-arm syndrome.

Summary

For the successful treatment of shoulder-arm syndrome, four basic concepts should be recognized. 1. Both physiological and psychological components of the disease must be treated. 2. An accurate diagnosis must be made before treatment is started. 3. The physiological component should be treated by functional interruption of the sympathetic nerves to the extremity with a method that is sufficiently complete and sufficiently continuous. 4. The physician should exhibit genuine interest, sympathy, and encouragement toward the patient as a person.

300 Homer Ave.

PAIN IN THE SHOULDER AND ARM FROM NEUROLOGICAL INVOLVEMENT

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and
H. R. Oberhill, M.D., Chicago

Pain in the shoulder and arm can often be traced to disease involving the vertebral column, the brachial plexus, or the peripheral nerves of the upper extremity. Case histories are given to illustrate the appearance of such pain as an early symptom in herniation of the intervertebral disk between the seventh cervical and first thoracic vertebrae, in intraspinal neurofibroma at the level of the third and fourth cervical vertebrae, in carcinoma of the pulmonary apex, in aneurysm of the subclavian artery, and in neurogenic sarcoma involving the radial nerve just above the elbow. Exquisite localization and sensitivity characterize small glomangiomas occurring in the subcutaneous tissues and small neurogenic sarcomas on subcutaneous nerves. Treatment of any of these conditions is most difficult unless the diagnosis is accurate. When a suitable lesion is found, operation often affords prompt and permanent relief of symptoms.

Pain in the upper extremity may arise from a variety of causes, but commonly it is the result of involvement of the nervous system. Such involvement may occur in the spine, in the brachial plexus, or in the peripheral nerves in the extremity.

Herniated Cervical Invertebral Disk

The most common neurological cause of pain in this region undoubtedly is a herniated cervical intervertebral disk. Although such lesions are not as common here as they are in the lumbar portion of the spine, they are very common. With few exceptions the herniations are found at the interspace between the fifth and sixth or the sixth and seventh cervical vertebrae. The symptoms produced by such lesions are remarkably stereotyped and characteristic. Typically the onset is with pain and stiffness of the neck. For a time these may be the only symptoms, and they may disappear and recur with variable frequency and over different periods of time. Sooner or later the patient begins to suffer from a radiation of the pain along the medial border of the scapula, into the shoulder, and at times into the anterior chest wall. This latter may be so severe as to cause the attending physician to think seriously of disease of the coronary arteries. The pain also radiates down the lateral aspect of the arm and at times into the fingers. On other occasions there is no true pain in the fingers but an annoying numbness and paresthesias.

When the herniation lies between the fifth and sixth cervical vertebrae, the sixth cervical spinal nerve root is compressed. As a result, the pain or numbness or both involve the thumb primarily and the index finger to a lesser degree. In addition, the biceps muscle is weak and the biceps reflex reduced or abolished. When the herniation lies between the sixth and seventh vertebrae the seventh spinal root is involved. The numbness and/or pain is in the index and middle fingers, the triceps muscle is extremely weak and often flabby and atrophic, and the triceps reflex is abolished.

Herniation at either of these interspaces is at times associated with numbness of the ulnar border of the hand and of the last two digits. This misleading symptom apparently arises from a spasm of the scalenus anticus muscle and is of no localizing value so far as the intraspinal pathology is concerned. In rare instances, however, paresthesia in the ulnar distribution is indicative of a herniation between the seventh cervical and first thoracic vertebrae, with compression of the eighth cervical nerve root. In such cases the correct diagnosis is indicated by the fact that the pain in the arm radiates down the medial rather than the lateral aspect. This situation is described in case 1.

Case 1.—A 43-year-old man was referred to us by Dr. N. C. Johns of South Bend, Ind. He was admitted to the Chicago Wesley Memorial Hospital on March 2, 1958, because of pain of approximately one year's duration in his right arm.

In the spring of 1956 and 1957 he had noted some temporary discomfort in his neck after spring gardening. There was no history of any injury to his neck. In the spring of 1957 the discomfort in his neck had been followed by a severe pain along the medial aspect of his right upper and lower forearm. At the same time numbness and tingling had appeared in the right little finger and the medial aspect of the fourth finger. Over a period of several weeks this improved, and he became able to return to work, but some numbness and pain continued. In February, 1958, his condi-

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tion became worse. He developed a cramping pain in the last two digits of his right hand, and flexion of his neck aggravated the pain in his arm and hand.

Examination revealed only an atrophy of the right hypothenar muscular mass. X-ray films of the cervical spine showed only a questionable narrowing of the interspace between the seventh cervical and first thoracic vertebrae (fig. 1, *left*). A myelogram was made which disclosed a large defect at the interspace between the seventh cervical and first thoracic vertebrae (fig. 1, *right*). X-ray examination of the chest, the remainder of his physical examination, and the examinations of his blood, urine, and spinal fluid were all negative. The total protein in the spinal fluid was normal, 34 mg. per 100 cc. of fluid.

On March 4, 1958, a large herniation of the intervertebral disk between C-7 and T-1 was removed. The patient made a prompt recovery, was discharged from the hospital on March 14, 1958, and was soon back at work.

Comment.—The diagnosis of a herniated cervical intervertebral disk is made primarily on the basis of the history and the physical findings. As in the case cited above, the x-ray examination of the cervical spine is often not helpful, or it may reveal only a straightening of the spine or a reversal of the normal lordotic curve (fig. 2, *left*). In many cases, however, one may find a localized narrowing of the intervertebral spaces, usually between C-5 and C-6, and/or C-6 and C-7 (fig. 2, *right*). Such narrowing is commonly associated with osteoarthritic spur formation on the neighboring vertebral bodies. Obviously such narrowing of the intervertebral space is indicative of degenerative changes within the intervertebral disk. Nevertheless, such changes may be misleading so far as involvement of the nervous system by herniated intervertebral disks is concerned. Such changes may be present without any evidence of involvement of either the spinal nerves or the spinal cord. Furthermore, such changes are commonly present at one level while the compression of the spinal nerve is at the neighboring interspace. Or, as has been pointed out above, a herniation of the disk may be present with a perfectly normal x-ray picture of the cervical spine.

Fig. 1. (case 1).—*Left*, herniated intervertebral disk between seventh cervical and first thoracic vertebrae. X-ray examination of spine is essentially normal. *Right*, myelogram showing large defect in the column of iophendylate at C-7–T-1 interspace on right side.

Fig. 2.—*Left*, herniation of intervertebral disk between fifth and sixth cervical vertebrae. Normal curvature of cervical spine is lost and replaced by reversed curve with apex at fifth cervical vertebrae (fig. 1). *Right*, herniated intervertebral disk between sixth and seventh cervical vertebrae. There is marked narrowing of intervertebral spaces between fifth and sixth and sixth and seventh cervical vertebrae, with narrowing of sixth cervical vertebral body and osteoarthritic spur formation.

Examination of the spinal fluid seldom provides much information in cases of herniated cervical intervertebral disks. The protein content of the fluid may or may not be slightly elevated, but striking increases in the amount of protein or evidence of obstruction of the spinal subarachnoid space, as shown by Queckenstedt's test, are seldom encountered.

Myelography, or visualization of the spinal canal with the aid of the x-rays and a contrast medium (usually iophendylate [Pantopaque]) will provide positive evidence of a herniated intervertebral disk in the cervical region in almost every instance (fig. 1, *right*). However, in the vast majority of cases the diagnosis can be made without such an examina-

tion, and we proceed to treat the patient in most cases without resorting to this test. In case 1 cited above, a myelogram was made because herniations at the C-7–T-1 interspace are so uncommon that we felt that our diagnosis should be confirmed before we subjected the patient to an operation. As it turned out it was quite unnecessary even here.

Treatment.—There is considerable difference of opinion regarding the treatment of choice in cases of herniated cervical intervertebral disk. Some neurological surgeons, notably Scoville, and Semmes and Murphey, feel that most, if not all, patients suffering from a herniated disk in this region should be operated on. We cannot share that opinion. In our experience about 80 to 85% of these patients are relieved by relatively simple conservative treatment. Such treatment consists of continuous cervical traction with 5 to 10 lb. for a period of approximately 10 to 14 days or until the acute symptoms have subsided and then relative immobilization of the neck in a plastic collar whenever the patient is up and about and possibly traction on the neck at night for another few weeks. In our experience intermittent traction with much greater amounts of weight one to several times a day for short periods is not very beneficial, and we have seen a few patients whose condition appeared to have been aggravated by such treatment. If bed rest with cervical traction does not provide fairly prompt lessening of symptoms, if there is profound muscular weakness and atrophy, or if the condition has been present for more than a very few weeks, or has been recurrent, we recommend that the patient be operated on and the offending herniated cartilage removed. We do not believe that any effort should be made to remove the disk material from between the vertebral bodies, nor do we believe that any form of spinal fusion is indicated in these cases. It seems to us that the anterior approach to the vertebral bodies with removal of the intervertebral disk from in front is a more drastic and more potentially dangerous operation than is required for a simple herniated cervical intervertebral disk.

Spinal Cord Tumor

Tumors arising in the cervical portion of the spinal canal can certainly produce pain in the neck, the shoulder, and the upper extremity, and frequently they do so. However, such lesions are far more rare than are herniated intervertebral disks in this region and usually produce other symptoms which soon make it obvious that we are dealing with something more than a simple lesion giving rise to a brachialgia.

At the onset, tumors, like herniated disks, may involve a single spinal root and may at that stage give rise to pain limited to the shoulder and arm on one side. Soon, however, the pain becomes more extensive than can be explained by the involvement of one nerve root; it spreads to the opposite side of the body; marked muscular weakness and atrophy appear in one or both upper extremities; and evidence of involvement of the spinal cord, with sensory changes on the trunk and in the legs and with weakness of the legs and difficulty in walking, and disturbances of the functions of the intestines and bladder appear. Examination, too, reveals changes beyond the confines of one shoulder and arm, with sensory alterations and disturbances of the reflexes in the legs as well as the arms. Examination of the cerebrospinal fluid will usually reveal evidence of obstruction of the spinal canal, an increase in the protein content, and often a xanthochromia of the fluid. Case 2 is a typical example.

Case 2.—A 55-year-old housewife was referred to us by Dr. Meyer Solomon of Chicago and was admitted to the Chicago Memorial Hospital on March 14, 1949. She had enjoyed good health until early in the year 1948, a little more than a year prior to her admission. At that time she began to suffer from sharp pains in the back of the neck on the left side. These radiated into the left shoulder and down the left arm. They were aggravated by lying down, especially by lying on her left side, and by even slight movement of her neck. These pains grew more severe. By early summer of that year tingling developed in the fingers of the left hand and soon extended up the left arm. Shortly thereafter the left arm became weak, and this weakness steadily progressed over the next several months to an almost complete paralysis of the left upper extremity. In the autumn of 1948 she first noted numbness of the left foot. Soon the left lower extremity became weak, occasionally causing her to fall. In January, 1949, she became unable to walk and developed difficulty in urination and in bowel movements. At about this same time

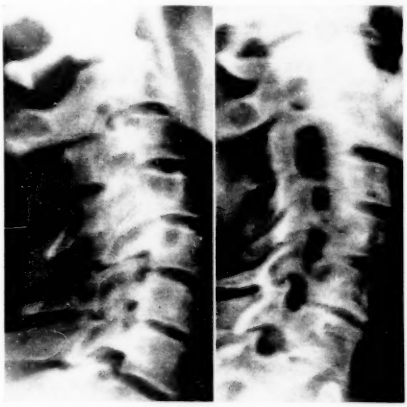

Fig. 3.—X-rays (similar to those in case 2) showing, *left*, lateral view of cervical spine revealing no abnormality and, *right*, oblique view of same spine disclosing marked enlargement of intervertebral foramen between C-3 and C-4 and erosion of neighboring pedicles. Importance of oblique views of cervical spine for recognition of such changes is clearly demonstrated.

paresthesia and weakness appeared in the right upper extremity, and she became unable to feed herself. She also complained of a band-like sense of constriction about the upper part of her chest.

On examination we found no evidence of involvement of her cranial nerves. There was an almost complete paralysis of her left upper and lower extremities and a diffuse atrophy of the left arm and hand. There was also a severe weakness of the right extremities. She was unable to stand. All tendon reflexes were grossly exaggerated, especially on the left side. The abdominal reflexes were absent and Babinski's sign was present bilaterally. Her neck was rigid and any movement of it would cause her to cry out with pain. There was a complete anesthesia along the medial aspect of the left arm and including the left hand and fingers. In addition there was a profound reduction in all forms of sensibility up to the clavicles bilaterally.

X-ray examination of the cervical spine revealed a marked enlargement of the intervertebral foramen between the third and fourth cervical vertebrae on the left side and an erosion of the pedicles of the third and fourth cervical vertebrae (fig. 3). The diagnosis of an intraspinal tumor, probably a dumb-bell neurofibroma at the level of the third and fourth cervical vertebrae was made; without further investigation the patient was operated on on March 17, 1949, and a large tumor of this type completely removed. Recovery began almost immediately and was rapid. Within two weeks she was able to empty her bladder voluntarily and to walk with the aid of the nurses. She was discharged to her home on April 6, 1949, and her recovery was soon complete.

Comment.—This is the typical story of an intraspinal tumor. The initial symptoms were those of irritation of the posterior spinal roots locally. Furthermore, the pain produced by this irritation was worse on lying down, as it so often is with intraspinal neoplasms. Soon, however, the manifestations of the presence and of growth of this tumor became more widespread, and evidence of involvement of the spinal cord as well as the nerve roots appeared. This more extensive involvement included the opposite upper extremity, the trunk, and both lower extremities. Nothing but a space occupying intraspinal lesion could have given rise to this picture. Fortunately, such conditions are usually easily recognized, and if proper treatment is prompt the results are commonly most gratifying.

Involvement of the Brachial Plexus

Trauma.—The brachial plexus may be involved in many ways. The more common are trauma, tumors of the lung, cervical ribs, spasm of the scalenus anterior muscle, and aneurysms of the subclavian artery. Trauma seldom causes any confusion. The responsible factor, be it a gunshot wound, an automobile accident, a knife wound, or some other type of trauma, is usually apparent. The paralysis and sensory loss resulting from damage to the plexus is commonly severe. The pain is of the diffuse, burning type commonly seen in causalgia. Usually it is aggravated by external stimuli and emotional disturbances. Its treatment is often difficult. If the local injection of procaine (Novocain) hydrochloride into the cervicothoracic portion of the ganglionated sympathetic chain provides definite relief, a sympathectomy may be considered.

Cervical Rib.—Fortunately cervical ribs seldom give rise to symptoms, but on occasion the lower part of the brachial plexus and the subclavian artery become compressed between the extra rib and the scalenus anterior muscle. In such cases the vascular symptoms and findings are obvious, and one should hesitate to make the diagnosis in their absence. The neurological symptoms are predominantly those one would expect from involvement of the eighth cervical and first thoracic nerve roots. These include pain and numbness of the ulnar border of the hand and last two digits and atrophy and weakness of the small muscles of the hand. The rib should, of course, be demonstrable on x-ray examination, and palpation in that area will commonly disclose the presence of a prominent subclavian artery and a fulness in the base of the neck even though the rib itself cannot be felt. In some instances section of the scalenus anterior muscles will suffice to give relief, whereas in others the offending rib may have to be removed.

Scalenus Anterior Syndrome.—Not many years ago the "scalenus anticus syndrome" was a common diagnosis and many patients were treated for this condition. It is now recognized that a scalenus anterior syndrome in the absence of a cervical rib is usually secondary to some other condition. In most instances this other condition is a herniated cervical intervertebral disk, as we have noted above. On one occasion I observed a woman with a typical scalenus anterior syndrome—involvement of the subclavian artery and lower part of the brachial plexus—where the difficulty had arisen as the result of a fall on her outstretched hand and the development of a tear in the scalenus anterior muscle and a hemorrhage. The condition soon subsided spontaneously.

Carcinoma of the Lung.—One of the more common and most tragic causes of pain in the shoulder and upper extremity is involvement of the brachial plexus by a carcinoma which has spread upward from the apex of the lung—the Pancoast tumor. In these cases the pain is generally severe. Although it is sharply localized to the shoulder and upper extremity on one side, it is usually diffuse in these areas and not localized to the distribution of any one peripheral nerve or spinal root. In addition to the involvement of the peripheral nerves of the upper extremity, it is common for the uppermost part of the thoracic ganglionated sympathetic chain to be involved, giving rise to a typical Horner's syndrome—slight ptosis of the upper eyelid, narrowing of the pupil, and loss of perspiration on that side of the face. Eventually there is marked muscular atrophy and weakness in the involved upper extremity as well as the generalized systemic manifestations of the pulmonary malignancy.

Unfortunately the tumor in the lung almost never gives any indication of its presence prior to the signs of neurological involvement. By this time all

hope of curing the tumor is lost. Relief of the pain from which these people suffer is difficult. High cervical cordotomy which theoretically should relieve them seldom does because of the difficulty in producing a permanent analgesia in the neck,

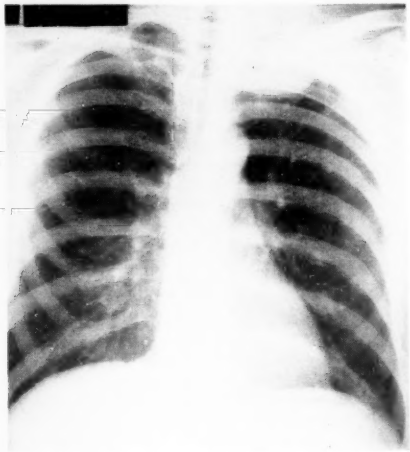

Fig. 4 (case 3).—X-ray of chest showing carcinoma at apex of left lung.

shoulder, and upper extremity. In most cases the best method of providing relief is a frontal lobotomy. Case 3 is typical of this group.

Case 3.—A 44-year-old man was referred by Dr. S. W. Banks and was admitted to the Chicago Wesley Memorial Hospital on March 30, 1957. About the first of the year he had noted a severe pain in the left shoulder. This had soon extended into the medial aspect of the left upper arm and forearm and into the hands and fingers. Gradually the small muscles of the hand had wasted and the entire extremity became weak.

Examination revealed moderate winging of the left scapula and weakness of the left latissimus dorsi muscle. All of the muscles of the left upper extremity had approximately half their normal strength. There was a mild hypalgesia in the area of distribution of the ulnar nerve. There was a fulness in the left supraclavicular fossa and various extension maneuvers of the head and neck suppressed the left radial pulse. X-ray examinations of the chest and cervical spine were negative. A diagnosis of a scalenus anterior syndrome was made, and this muscle was divided by Dr. Walter Maddock, with dramatic relief. Four weeks later, however, the patient returned with a recurrence of his symptoms. Horner's syndrome was now present on the left side. The swelling in the supraclavicular region was more marked and was tender. The findings previously present were unchanged except that the radial pulse could no longer be modified by movements of the head and neck. X-ray examination of the chest at this time revealed a definite area of increased density in the left pulmonary apex (fig. 4). The diagnosis of a carcinoma of the lung was now obvious. It was treated with x-ray therapy and nitrogen mustard by Dr. T. H. Clarke with some temporary improvement. However, the patient's general condition rapidly deteriorated and about two months after his final discharge from the hospital he died.

Aneurysm.—Involvement of the brachial plexus by an aneurysm of the subclavian artery is not common, but case 4 is typical of this condition.

Case 4.—For seven months this 51-year-old man had suffered from a dull pain when using his right hand, cramping at the base of the thumb, and loss of strength in the hand. For three months the right hand had been cold and sometimes blue. Exercise for any length of time was impossible because of pain. For one month he had had pain on the medial aspect of his forearm and some discomfort in the right supraclavicular region. He was more comfortable when he slept with his arm above his head. At times the fourth and fifth fingers of his right hand felt numb.

Examination revealed a pulsating mass in the right supraclavicular region, which was somewhat tender (fig. 5). His blood pressure was 180/10 mm. Hg in the left arm but could not be obtained on the right. There was a hyperesthesia on the medial aspect of the right forearm and slight weakness of the musculature of the right hand. There was no atrophy and no sensory loss. The right hand was cooler and paler than the left. The pallor was increased by elevating the right extremity. The fingernails on the right side were slightly cyanotic. X-ray examination revealed bilateral cervical ribs.

A diagnosis of an aneurysm of the subclavian artery was made and the patient was operated on. There was an aneurysm lying distal to the tendon of the scalenus anterior muscle, and the artery was definitely constricted beneath the tendon of that muscle. The muscle was divided. The results were most gratifying. The hand resumed a normal appearance, and there was no pain even with use of the hand. The radial pulse improved, but the blood pressure could not be elicited on the right side. The patient died three years later of a coronary occlusion.

Comment.—The relationship of the cervical rib to the development of this aneurysm is not certain, although the possibility that the constriction of the

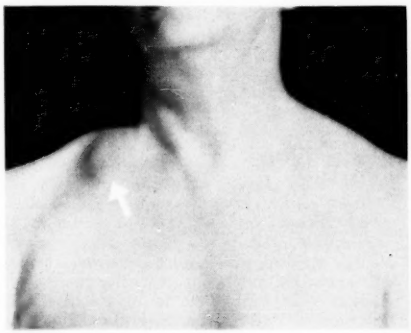

Fig. 5 (case 4).—Aneurysm of right subclavian artery causing supraclavicular swelling.

artery between the rib and the muscle may have led to the appearance of this aneurysm cannot be denied. Today the aneurysm probably would have been resected and replaced by another vessel or a

plastic sleeve. The important factors in the correct diagnosis here are the pulsating mass, the peripheral evidences of vascular deficiency, and the pain and hyperesthesia in the medial aspect of the upper extremity.

Involvement of Peripheral Nerves

In civilian practice involvement of the peripheral nerves is an uncommon cause of pain in the upper extremity. During war, on the other hand, gunshot wounds of the nerves in the arm commonly give rise to severe pains, known as causalgia. Such pain may be relieved by sympathectomy but is difficult to treat satisfactorily in many instances. Case 5 is an unusual instance of severe pain in the arm arising from a tumor in a peripheral nerve.

CASE 5.—A 2-year-old boy was operated on by Dr. Sam W. Banks. He was admitted to the Chicago Memorial Hospital on June 4, 1953, because of severe pain and tenderness in his right arm. About four months earlier his grandmother had inadvertently twisted his right arm in pulling him away from an electrical outlet. Almost immediately thereafter he began to complain of pain above his right elbow and cried out violently each time the arm was touched. He did not use the arm as much as formerly.

On examination the right arm appeared to be moderately swollen just above the elbow, and the child made every effort to prevent anyone from touching this part of the arm or in any way examining it. Nevertheless he used the arm moderately well. X-ray examination of the right humerus and of the elbow joint was negative.

On June 4, the tender area was explored surgically. There was a diffuse swelling of the radial nerve over a distance of approximately 1.5 in. where it lies between the brachioradialis and the more medially placed muscles. This appeared to be a tumor, and that portion of the nerve containing the tumor was excised. The two ends of the nerve were approximated with appropriate sutures. The arm was immobilized in a cast with the elbow flexed. Microscopic examination of the tumor showed it to be a neurogenic sarcoma. The arm was gradually extended and the cast removed. The boy made a complete recovery, and when last seen on May 14, 1958, he was perfectly well. There was no evidence of recurrence of the tumor and no muscular weakness or atrophy, no reflex changes, and no sensory loss.

Glomangioma.—Another type of lesion which occasionally gives rise to pain in an upper extremity is a glomangioma. These neurovascular tumors commonly develop beneath the fingernail but may occur elsewhere in the subcutaneous tissues. Small neurogenic sarcomas on subcutaneous nerves may give rise to similar symptoms. Both types are characterized by their exquisitely localized and intense sensitivity. They commonly give rise to pain when the hand is unintentionally bumped against some object such as a piece of furniture. Under the fingernail, and occasionally in the subcutaneous tissues, they may be seen as small bluish masses. Although the point of tenderness is sharply localized, the intense pain which is produced when these tumors are struck sharply radiates upward and often involves the entire upper extremity. Prompt relief is obtained by their removal.

Comment

The various types of lesions involving the nervous system which may give rise to pain in the shoulder and upper extremity are far more numerous than the few which we have enumerated here. However, these are the more common and are typical of the other less common lesions which may occur intraspinally, in the brachial plexus, or in the peripheral nerves in the upper extremity.

250 E. Superior St. (11) (Dr. Bucy).

The record of case 4 was supplied by Dr. John J. Fahey of Chicago.

CONSERVATISM IN CANCER OPERATIONS.—There are at least three biologic types of cancer: (1) cancers that do not tend to metastasize, (2) those that metastasize chiefly to the regional lymph nodes, and (3) those that, even before the primary tumor is recognized, have metastasized systemically. . . . It is only in treatment of the cancers that tend to metastasize solely to regional lymph nodes that radical resections of lymph nodes are of value. In some kinds of cancer, like squamous cell cancer of the mouth, metastasis limited to the regional nodes is so common that radical operations are well justified. In other kinds of cancer, like those of the lung, the tumors tend to be so widely disseminated before the presence of the primary tumor is recognized that little is gained by extending the scope of the operation. In these cases, involvement of lymph nodes is more a sign of incurability than an indication for extending the scope of the operation. Finally, there are many cancers, like cancers in a polyp of the rectum, which tend to be localized and can be cured by local treatment. If extensive operations are done to cure such localized tumors, the morbidity and mortality of the operations far exceed the possible dangers of recurrence after local treatment. Overtreatment of cancer may be just as dangerous as undertreatment. A proper balance is a matter of clinical judgment in each individual case.—George Crile, Jr., M.D., F.A.C.S., The Case for Conservatism in Operations for Cancer, *The Surgical Clinics of North America*, October, 1958.

PAIN IN THE SHOULDER AND UPPER EXTREMITY

VISCERAL CAUSES CONSIDERED BY THE INTERNIST

Edward H. Morgan, M.D., Seattle

Because the word shoulder is used loosely by most patients, the location of a shoulder pain generally needs to be specified more exactly by the physician. He must next determine whether the cause is local or remote. A case history illustrates the puzzling results of repeated examinations of a painful shoulder in a woman who proved to have adenocarcinoma of the lung. Another patient, whose illness was ushered in by pain in the left forearm and hand, was found to have an intrathoracic tumor with partial destruction of two thoracic vertebrae. In the author's experience an extremely important common cause of shoulder pain is pulmonary infarction involving the diaphragmatic surface of the lung, but a variety of possibilities must be considered, including cardiovascular, intra-abdominal, and even genitourinary disease. The laterality of the pain must be kept in mind, and pain in the right scapular region, for example, suggests biliary disease. When disease is intrinsic in the shoulder, the pain is commonly felt in the deltoid region, where pain of visceral origin rarely appears.

In medical practice, patients who complain of pain in the shoulder and upper extremity are commonly encountered. Whereas there are many causes for pain so located, two principal categories exist—local and remote. As pointed out by Albert and Rechtman,[1] the differentiation of these two broad categories is usually simple, since the absence of objective findings at the site of pain leads one to consider remote causes. While the remote causes are many and varied, this paper will be concerned with pain in the shoulder and upper extremity caused by diseases of cardiovascular, respiratory, gastrointestinal, and genitourinary systems. To be excluded is the stiff painful shoulder produced by adhesive capsulitis associated with the inactivity of myocardial infarction, pulmonary tuberculosis, and other disabling disorders.

Anatomic Considerations

The patient who complains of pain in the shoulder often uses the term shoulder broadly. When patients so afflicted are asked to indicate the site of pain, they often designate areas far beyond the confines of the shoulder itself. Hence, for the sake of establishing the patient's concept of the shoulder, the entire pectoral girdle must be considered. Included as shoulder, then, are the supraclavicular area, the infraclavicular and pectoral areas of the thorax, the trapezius ridge and suprascapular regions, the deltoid region encompassing the point of the shoulder, the entire scapular region including the inferior angle or tip of the scapula, and the upper axilla (fig. 1).

There are several mechanisms by which extrinsic disease can be manifested as pain in the shoulder and upper extremity. The first of these lies in the fact that the cervicothoracic outflow of sympathetic fibers and ganglions emerges from the superior thoracic outlet. In addition, the brachial plexus traverses the superior thoracic outlet. Any disease process in the region of the pulmonary apex involving the neural structures named above thus can be manifested as pain in the shoulder and upper extremity (fig. 2).

Of greatest significance in the remote sources of shoulder pain are the diaphragm and phrenic nerves. Both superior and inferior surfaces of the diaphragm are supplied by phrenic afferent fibers originating most commonly in the third and fourth cervical segments. The long course of the phrenic nerves through the superior thoracic outlet along the pericardium extending the length of the entire mediastinum offers countless sites for disease to initiate afferent pain impulses. Furthermore, the broad areas offered by both superior and inferior surfaces of the central diaphragm constitute huge targets for disease to be manifested as pain in the shoulder (fig. 3). At this time it is appropriate to refer to the work of Capps and Coleman [2] who described both experimentally and clinically the localization of pain principally in the trapezius ridge resulting from stimulation of afferent sensory fibers in both superior and inferior surfaces of the central portion of the diaphragm. It is significant that in 23 cases of experimental stimulation and in 33 cases of diaphragmatic pleurisy, pain was appreciated only in the trapezius ridge, the supraclavicular region, and, in one instance, the area over the superior angle of the scapula. It should be noted that in

From the Division of Medicine, the Mason Clinic.

Read in the Symposium on the Diagnosis and Treatment of Pain in the Shoulder and Arm before the Joint Meeting of the Section on Orthopedic Surgery and the Section on Physical Medicine at the 107th Annual Meeting of the American Medical Association, San Francisco, June 27, 1958.

none was the pain localized lateral to the acromion.

As previously stated, the absence of local objective findings in the painful shoulder leads the physician to seek elsewhere for the cause of pain. Unfortunately, however, a reasonable search sometimes is unrewarding early in the course of a grave illness. A pertinent example is presented in case 1.

Report of Cases

CASE 1.—In June, 1957, a 42-year-old housewife and waitress sustained a blow to the right anterior part of her chest in a fall against a booth while at work. She stated that her wind was knocked out by the blow. One month after the injury, pain appeared in the lower posterior cervical region and in both shoulders. Several weeks later the pain became localized to the right shoulder and arm and forced her to seek medical consultation two months after the injury. At that time the pain was located chiefly at the point of the shoulder and at the radial area of the elbow.

An x-ray of the shoulder was considered within normal limits. In September, 1957, because of continued pain, an x-ray of the chest was made and considered within normal limits. Pain then was most severe along the upper right costochondral junctions. The physician attending her believed that the pain was the result of the injury. Two weeks later, because of continued pain, films of the thoracic spine were

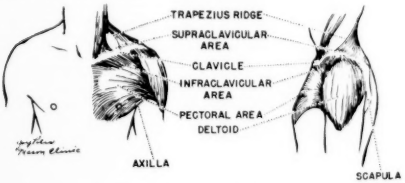

Fig. 1.—Anatomic regions referred to as shoulder by patients.

made, the only findings being hypertrophic changes. Treatment with cervical traction, phenylbutazone, prednisolone, and intravenously given procaine was of no avail.

Finally, in December, 1957, the patient was admitted to the hospital where physical examination disclosed tenderness of the right posterior part of the neck, scapular region, and infraclavicular area. Cervical compression caused moderate pain in the neck. Whenever the patient was in the erect position, pain in the right shoulder eventually forced her to lie down. An x-ray of the chest revealed a right upper mediastinal mass as shown in figure 4. Thoracotomy and biopsy confirmed the diagnosis of inoperable adenocarcinoma of lung.

The foregoing case record indicates difficulty in establishing diagnosis early in the course of an illness characterized by shoulder pain of pulmonary neoplastic origin. A second similar type of problem is apparent in the following patient whose illness first manifested itself as pain in the left forearm and hand.

CASE 2.—A 63-year-old furniture factory worker and former miner had been examined over a period of two years by the chest clinic of a city public health service. Typical nodular lesions of silicosis were found in the x-ray film of the chest (fig. 5), and repeated x-rays eventually revealed stability of these lesions. The last film was taken three months prior to the onset of the patient's illness, which was ushered in by pain in the left forearm and hand and later by the development of Horner's syndrome on the left. A roentgenogram taken several months after the onset of the illness revealed a left apical intrathoracic tumor (fig. 6), and in a film of the spine destructive lesions of the transverse processes and bodies of the first and second thoracic vertebrae were seen (fig. 7).

In an attempt to arrive at a diagnosis a supraclavicular and an axillary lymph node were removed. Neither of these nodes manifested abnormalities which would suggest the

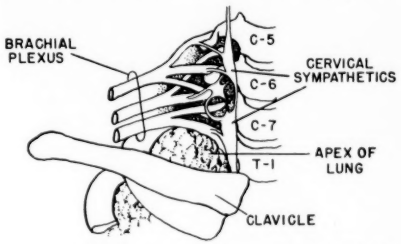

Fig. 2.—Location of cervicothoracic sympathetic outflow and brachial plexus in close relationship to pulmonary apex at superior thoracic outlet.

nature of the left apical tumor. Successful biopsy, however, was performed by means of a needle inserted into the region of the transverse process of the first thoracic vertebra. Microscopic examination of the tissue removed revealed a well-differentiated squamous cell carcinoma. The findings in this case were consistent with the diagnosis of a superior sulcus tumor that was inoperable because of neural and osseus involvement.

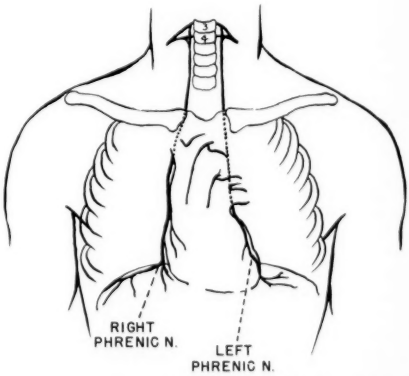

Fig. 3.—Long course through cervical and mediastinal regions and broad distribution of phrenic fibers to both superior and inferior surfaces of central diaphragm.

Comment

The pains in the two patients described above constitute examples of pain in the shoulder and upper extremity originating in malignant disease

of the respiratory tract and appearing in the shoulder and arm on the basis of involvement of brachial plexus and sympathetic outflow by the malignancy. The frequent occurrence of infectious respiratory illnesses with pleuritis involving the diaphragm is

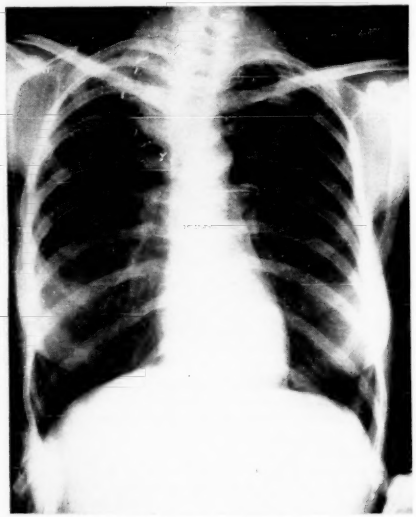

Fig. 4. (case 1).—Thoracic roentgenogram of woman who complained of pain considered due to an injury, until right upper mediastinal mass was discovered. Thoracotomy disclosed inoperable undifferentiated pulmonary adenocarcinoma.

not foreign to the practice of most physicians and deserves only mention here. An extremely important common cause of shoulder pain, as emphasized by Leland,[3] is the pain of pulmonary infarction involving the diaphragmatic surface of the lung. In my personal experience this is one of the commonest shoulder pains of visceral origin. When a patient in the postoperative state or a patient with disabling injuries of the lower extremities encased in plaster, or fixed in traction, complains of pain in the shoulder, the diagnosis of pulmonary infarction is likely to be confirmed.

Diseases of the cardiovascular system offer many opportunities for pain in the shoulder and upper extremities, since the heart itself, the pericardium, the major vessels, and the peripheral vascular structures can be responsible. Ordinarily the pain of symptomatic coronary arteriosclerosis is located in the anterior central thorax, although the shoulders, upper extremities, neck, and jaw can be involved. In my experience patients with angina pectoris and myocardial infarction who complain of pain in the arm and shoulder also almost always acknowledge anterior thoracic pain when specifically questioned. Although no hard rule can be applied, the usual site of pain in the shoulder and upper extremity is more likely to be left-sided, infraclavicular, and ulnar in location. This tendency to ulnar location is reasonable on an anatomic basis since the upper four thoracic spinal segments supply afferent pain fibers via the sympathetic pathways to the deep cardiac plexuses.

When the ascending aortic arch is involved with disease, pain tends to be appreciated in the right side of the neck and shoulder, and pain originating in the transverse and descending arch appears in the left side of the neck and shoulder.

As pointed out by Barker,[4] peripheral vascular diseases causing pain in the arm and shoulder are accompanied by findings of significance. These consist of swelling, discoloration, prominent superficial veins, ulceration or gangrene of the digits, absent arterial pulsations, palpable thrombosed veins, abnormal coldness or warmness of skin, thrills, bruits, and pulsating masses. When appropriate physical findings are lacking, peripheral vascular disease is not likely to be the cause of pain in the arm and shoulder. Pain from most peripheral vascular diseases involving the upper extremity is apt to be in

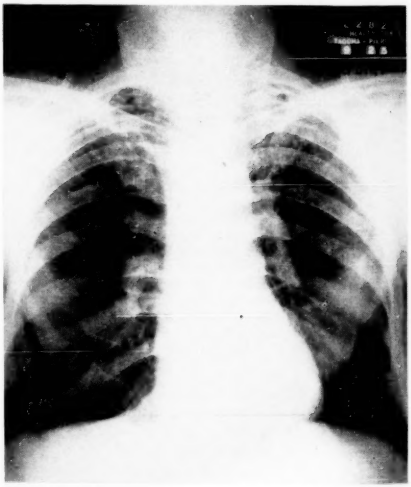

Fig. 5. (case 2).—Chest x-ray showing bilateral apical lesions considered to be consistent with diagnosis of silicosis.

the digits, e. g., Raynaud's disease, arterial occlusive disease, and erythromelalgia. In venous thrombosis and acute and chronic lymphangitis the arm and forearm are more likely to be diffusely involved in pain.

Diseases of the gastrointestinal tract may be responsible for pain in the shoulder. The esophagus, a perforated viscus, and the biliary tract are common sites of origin. Olsen [5] calls attention to pain of diffuse esophageal spasm occasionally being referred to the arms. Hiatus hernia can mimic pain of cardiac origin with reference to the infraclavicular region and ulnar side of the arm (usually the left), but it also can be manifested as pain in the trapezius ridge when the mechanism of its production stems from central diaphragmatic irritation.

The perforated viscus is a common cause of referred pain in the shoulder, and the occurrence of pneumoperitoneum is the well-known sign of such an event. Not to be forgotten, however, is the pain in the shoulders caused by air in the peritoneal cavity resulting from any laparotomy. Pearce [6] directs attention to the common reference of pain to either or both shoulders in perforated ulcer and mentions one instance of a patient with a posteriorly perforating gastric ulcer who lacked abdominal rigidity and whose pain was appreciated only in one supraspinous fossa.

The biliary tract possesses three mechanisms whereby pain can appear in the shoulder. Lewis [7] has directed attention to the distribution of right

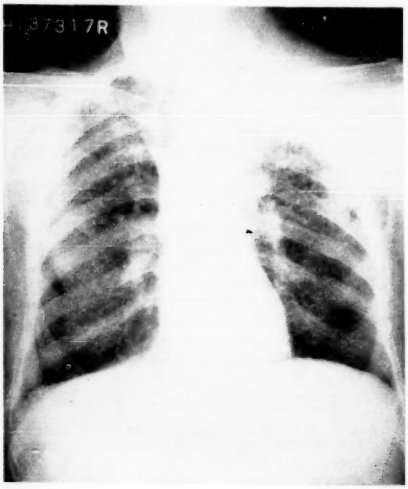

Fig. 6. (case 2).—X-ray revealing a large apical density, three months after onset of severe pain in left forearm and hand. This film was made less than one year after that shown in figure 5.

phrenic afferent fibers to the coronary and falciform ligaments, parts of the hepatic capsule, the gallbladder, and the liver itself. Hence pain in the right trapezius ridge occurs in some instances of lesions of gallbladder and hepatic parenchyma. A second mechanism is the direct irritation of the central diaphragm as in liver abscess. The third type of referred pain is that of right scapular pain from disease of the gallbladder produced by stimu-

Fig. 7. (case 2).—Anteroposterior view of cervicothoracic spine. Destructive lesion at left second thoracic transverse process is shown.

lation of visceral afferent fibers in the major splanchnic nerve with central connections in thoracic segments 6, 7, 8, and 9. This referred pain, however, is almost invariably accompanied by deep epigastric discomfort. Lateralization of the viscera and their pain pathways makes the right shoulder the usual target for referred pain of biliary origin.

When disease of the pancreas is the cause of pain in scapular or shoulder regions, the reference of pain to these areas has been found to be a secondary extension of abdominal pain.[8] The genitourinary tract introduces the factor of sex into a consideration of shoulder pain of visceral origin. In a woman in the childbearing years who complains of pain in the shoulder, the clinician must be alert to the possibility of intraperitoneal hemorrhage from ruptured ectopic pregnancy. The common target of the head of the humerus for metastases from carcinoma of the renal cortex deserves mention, since both the metastases and the primary lesion itself

can be very difficult to demonstrate early in the course of the illness. The above mentioned areas of predilection for shoulder pain of visceral origin are illustrated in figure 8.

Summary and Conclusions

Patients who complain of pain in the shoulder and arm are commonly encountered in medical practice. Whereas there are many causes for pain so located, two principal categories exist, local and remote. The differentiation of these two categories is not difficult, since the absence of objective findings at the site of pain leads one to consider remote causes.

Certain anatomic considerations are worthy of comment. The patient's concept of the shoulder is generally broad and includes the area of the entire scapula, the suprascapular region, the trapezius ridge, the supraclavicular fossa, the clavicular and

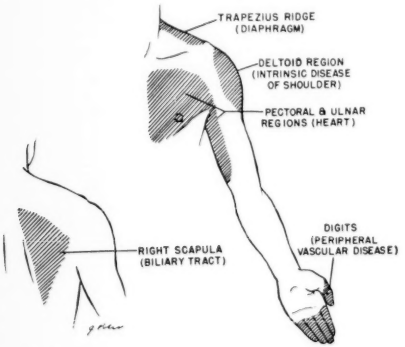

Fig. 8.–Usual sites of pain in shoulder due to remote causes.

infraclavicular regions, the pectoral region, the upper axilla, and the deltoid areas. Extrinsic disease can produce pain in the shoulder by involvement of the cervicothoracic outflow of sympathetic fibers or the brachial plexus at the superior thoracic outlet, as well as the phrenic nerves traversing longitudinally the entire mediastinum and supplying both surfaces of the diaphragm. Countless targets are offered to disease processes in the abdomen, thorax, and neck by the aforementioned neural pathways, any of which may yield pain in the shoulder. Two cases of apical pulmonary neoplasms in patients who complained of pain in the shoulder and upper extremity constitute examples of difficulty in discovering remote causes of shoulder pain, as well as examples of disease of the respiratory tract causing shoulder pain.

The role of diseases of the heart, great vessels, and peripheral vessels as causes of pain in the shoulder and arm is summarized as follows. The pain of myocardial ischemia is generally localized to the left pectoral region and the ulnar side of the left upper extremity. Peripheral vascular diseases are more apt to result in pain in the arm, forearm, and digits, accompanied by easily recognized findings.

Ordinarily the mechanism by which gastrointestinal diseases produce shoulder pain is by involvement of the central diaphragmatic surfaces. Hepatic pain referred to the shoulder can result from direct irritation of phrenic afferents in the hepatic plexuses. The factor of lateralization deserves attention, since hepatic and biliary pain generally are felt in the right trapezius ridge or scapular region.

Disease of genitourinary organs involves consideration of sex, since only women are susceptible to ruptured ectopic pregnancy, which often first manifests itself as shoulder pain. It is not uncommon for carcinoma of the renal cortex to produce shoulder pain by metastasis to the head of the humerus.

In conclusion, pain in the trapezius ridge is typical of diaphragmatic irritation either from intrathoracic, intra-abdominal, or pericardial disease. Pain in the left pectoral and ulnar areas is apt to be myocardial in origin. When the complaint of pain is localized to the digits, peripheral vascular disease must be considered. Pain in the right scapular region is suggestive of biliary origin. Rarely does pain of remote visceral origin appear in the deltoid region, the common site of pain due to intrinsic disease of the shoulder.

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SHOULDER PAIN

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Pain that is localized in the shoulder joint may be acute or chronic. The joint may be injured by either direct or indirect trauma. Some relief is afforded by ice bags, salicylates, and codeine during the acute stage, but an arthrogram may be necessary for precise diagnosis, and surgical repair depends on exact understanding of the anatomy. Musculotendinous lesions, while frequently induced by acute trauma, tend to attain chronicity in patients over 40 years of age. Frequent findings in the chronically painful shoulder are calcification of the joint capsule and pericapsular structures, bicipital tendinitis, and immobilization of the joint by pericapsulitis and periarthritis. Pain not localized in the shoulder but referred to it has a number of possible causes, including structural abnormalities and trauma to the cervical part of the vertebral column. These may often be treated with success by means of traction, supportive collar, posture, and carefully prescribed exercise.

Any paper concerned with the shoulder cannot readily be written without a tribute to the late Dr. E. A. Codman.[1] Just prior to 1934, he wrote of shoulder pain as "difficult to define, difficult to treat, and difficult to explain from the point of pathology." While the difficulties were incompletely resolved, the stimulus for study was initiated. No longer can the diagnosis of "subdeltoid bursitis" be used with professional decorum and the affliction left to run a course aided or abetted with poultices, pills, and plaster. An understanding of the mechanics of the shoulder joint is essential in the proper diagnostic evaluation of the problem of shoulder pain and to an intelligent approach to its treatment.

The construction of the shoulder permits the arm to rotate 180 degrees, to swing in any plane through an arc of 180 degrees, and to combine these motions to permit reach to any point inside a hemisphere with a radius of equivalent length of the arm. The upper extremity is not unlike a moving boom crane (fig. 1). The body of the crane is the scapula; the scapula is tethered through an acromioclavicular joint to the clavicle which acts as an outrigger from the sternum to prevent the scapula from collapsing against the chest wall. The scapula glides, without a fixed track, along the chest wall—costoscapular motion. The fulcrum between the body of the crane and its 2-ft.-plus boom is a plum-sized sphere against a half-dollar-sized surface—the glenohumeral joint.

It should be emphasized that the arm lifts or supports weight more than half that of the body. Since the act of lifting involves motion of both the scapula and the humerus, one can readily visualize the necessity for firm stabilization of the scapulohumeral joint. The glenoid does not accurately fit the humeral head (fig. 2): the contraction of the deltoid muscle without a fixed fulcrum effects a vertical pull on the humerus which snugs it under the acromion. Some type of stabilization of the shoulder must, therefore, take place to permit the deltoid muscle to raise the arm (fig. 3). This stabilization is effected by the muscles arising from the scapula which are attached with the shoulder capsule. As the scapular muscles contract, they fix the fulcrum between the humerus and the scapula. Abduction of the shoulder is initiated by the contraction of the supraspinatus, then the infraspinatus, and the teres minor. As the deltoid contracts, its vertical pull is opposed by the teres major, subscapularis, and the tendon of the long head of the biceps. Any disparity in the balance of the scapulohumeral muscles may result in shoulder disability.

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Local Causes of Shoulder Pain

Local causes of shoulder pain may be from direct or indirect trauma. Direct trauma most frequently is associated with fracture of the clavicle, dislocation of the acromioclavicular joint or sternoclavicular joint, fracture of the surgical neck of the humerus, fracture of the acromion, or of some portion of the scapula. Indirect trauma results in dislocations of the shoulder, tear or rupture of sections of the shoulder cuff, or fractures through the anatomic neck of the humerus.

Traumatic injuries, with the exception of shoulder cuff tears, are readily visualized by x-ray examination. Major cuff tears, however, may be determined by arthrogram. Immediate recognition and treatment of traumatic injuries, including the supervision of prescribed, graduated exercises for restoration

of shoulder function, will in most instances yield good or excellent functional results, with seldom any significant permanent partial disability.

Acute sprain of the supraspinatus tendon is treated by a sling and swathe or by a Velpeau bandage. If after local infiltration of procaine the arm cannot be abducted, the arm is best held in an

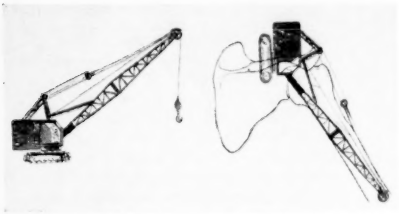

Fig. 1.—Comparison of shoulder to boom crane.

abduction splint. If there is further reason to suspect that there is a cuff tear of sufficient extent to prevent the abduction, an arthrogram is indicated (fig. 4). The more extensive tears are surgically repaired. With acute shoulder pain, application of ice bags locally is better tolerated than heat. Salicylates every fourth hour during the day, and codeine, or its equivalent, at night are generally necessary. Exercise consisting of removing the sling and swathe and bending forward, allowing the arm to drift into a flexed position, is indicated during the first few days and should be repeated 5 to 10 times three or four times daily. As acuteness subsides, a pendulum exercise may be started. As the flexion of the arm with gravity eliminated reaches approximately 110 degrees, overhead pulley exercise may be instituted. No exercises in the lateral plane or exercises which involve rotation of the shoulder joint are permitted until a full 180 degrees' elevation in the anterior plane is attained.

Fig. 2.—Without fulcrum, deltoid muscle fails to abduct arm.

Musculotendinous lesions, while frequently induced by acute trauma, have a tendency to attain a state of chronicity in individuals over 40 years of age. This chronic state may come about through misunderstanding by the patient and the physician of the importance of guided rest and graduated exercises after injury. The repetition of minor strains enhances synovial reaction, muscle spasm, tendon contracture, and capsular adherence. These may be very subtle and may occur without acute trauma after such endeavors as struggling to locate the sleeve of a heavy coat with the left hand during the first few days of cold weather, a few hours of painting a ceiling, or a session of curtain hanging.

Causes of Chronic Shoulder Pain

The following lesions are most frequent causes of the chronic, painful shoulder: calcification of tendons of the shoulder cuff, bicipital tendinitis, and "frozen shoulder."

Calcification.—Calcification in the shoulder cuff is apparent on x-ray examination and may vary in size from a fleck to a mass of material which may be two or more centimeters in diameter. The calcification, while usually located near the region of insertion, and within the fibers of the supraspinatus tendon, can occur within the shoulder cuff near the attachment of the infraspinatus, the teres minor, or the subscapularis tendons. The calcifications with acute symptoms are generally soft and

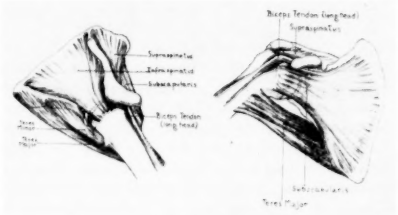

Fig. 3.—Diagrammatic representation of musculotendinous stabilization of shoulder showing view from, *left*, above and, *right*, front.

creamy in consistency. Those of longer duration are likely to be granular. Olsson [2] has stated that the histories obtained from records of patients on whom he performed autopsy gave no relation of shoulder symptoms to the amount of degenerative changes that he found in the capsule of the shoulder joint. DePalma,[3] from autopsy material, previously reached a similar conclusion.

Our clinical experience with living patients tends to verify this. On radiographic examination the presence and even the extent of calcification bears no direct correlation to the symptomatology. When there is a symptomatic calcification of the shoulder cuff, an attempt is made to aspirate the calcified material, and hydrocortisone, 25-50 mg., is introduced into the area. It is frequently necessary to repeat this injection of hydrocortisone after five days. In our experience, it is seldom necessary to surgically remove the calcifications. Bosworth,[4] however, after an extensive case study concluded that any calcification larger than 1.5 cm. in diameter will eventually be symptomatic and that the larger

the calcification the greater the incidence of surgical removal. We believe, if surgical removal of calcifications is undertaken, it is advisable to hold the arm, after operation, in neutral rotation and 90-degree abduction with balanced suspension (fig. 5).

A diffuse calcification of the shoulder cuff or an exostosis of the acromion can be responsible for impingement when the arm is brought into the abducted position. Excision of the acromion as advocated by Smith-Petersen [5] has been the treatment of choice (fig. 6).

A subdeltoid bursitis, as such, practically does not exist as a cause of shoulder disability. It is, however, possible for the subacromial bursa to be involved secondarily. This has been found where there has been tearing of the shoulder cuff or rupture of a calcific deposit. At times when an old extensive cuff tear is explored, the entire subdeltoid area may be filled with increased fluid, multiple loose cartilaginous bodies, and a chronic villous synovitis.

Bicipital Tendinitis.—Bicipital tendinitis, first described by Hitchcock and Bechtol,[6] presents local tenderness in the bicipital groove, pain with active use of the biceps, or passive stretching of the biceps tendon. As has already been mentioned, the biceps tendon plays a major part in the stabilization of the humerus when the deltoid muscle contracts to elevate the humerus. The tendinitis generally responds to local infiltration with hydrocortisone. It is necessary to prevent extension or external rotation of the shoulder joint until the tendinitis has subsided. At night, for comfort, it may be advisable to have the patient wear a sling and swathe in order to maintain the elbow in the region of the umbilicus. This position relieves stretch on the bicipital tendon as well as on the supraspinatus tendon. During the day, exercise is encouraged as tolerated. In resistant

Fig. 4.—Arthrogram of shoulder showing, *left*, rupture of cuff and, *right*, cuff after repair.

cases in which the x-ray shows a higher position of the head of the humerus in relation to the glenoid, it may be advisable to divide the transverse humeral ligament or to perform a tenodesis of the long biceps tendon to the bicipital groove of the humerus. If this procedure is carried out, it is recommended that the contracted proximal portion of the tendon extending to its insertion at the glenoid be divided or removed.

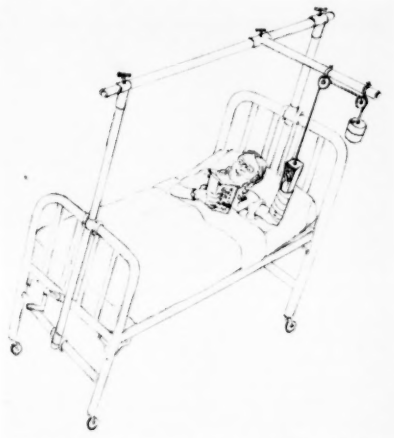

Fig. 5.—Type of traction used for painful or stiff shoulders.

"Frozen Shoulder."—The term frozen shoulder, while descriptive, is not a scientific one. Pericapsulitis and periarthritis are terms utilized for the same symptom complex. The condition results in a loss of scapulohumeral motion. The subject complains of pain which is more or less continuous, particularly pronounced when lying down, and occurring with any attempt to utilize the corresponding hand to work zippers or buttons at his back. The x-ray study will show a higher relationship of the head of the humerus to the glenoid, and, depending on the duration of symptoms, there may be considerable bone atrophy. The "frozen shoulder" frequently is associated with the hand syndrome. Here, depending on the stage of evolution, there may be swelling of the hand, shininess of the skin, a loss of the normal concavity between the metacarpal heads on the dorsum of the hand, and atrophy of the intrinsic muscles; there will consistently be loss of motion in the metacarpalphalangeal and the interphalangeal joints. On the palmar surface of the hand, there is apparent, late in the course, a nodularity in the fascia similar to that found with Dupuytren's contracture.

Coventry [7] refers to a "periarthritic personality." Such persons have a history of numerous illnesses; they are almost always accompanied at the time of office visit by one or more others, frequently not members of their family. The pathology of the "frozen shoulder" reveals an adherent capsule which is contracted; this tends to fix the shoulder. Under direct visualization, it is found that the sub-

scapularis muscle must be divided, the long biceps tendon must be freed, and the teres major and the pectoralis major must be partially released from their insertions to the humerus to permit external rotation. The inferior capsule of the joint must be

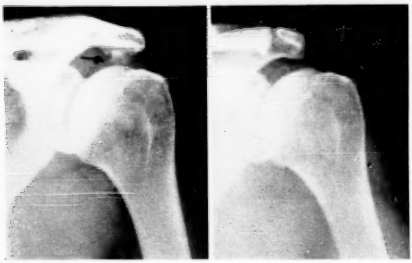

Fig. 6.—*Left*, exostosis of acromion as cause of subacromial bursitis. *Right*, four months after acromioplasty.

divided to obtain abduction. The joint is dry. It has been our experience to find that, even though the shoulder is held in abducted position for as long as six weeks after operation, and endeavors made to utilize the muscles in the abducted position, these patients tend to contract down as soon as the abducted position is abandoned.

It is our opinion that bed rest with balanced traction and suspension is a better method of handling resistant cases than to attempt manipulation or open surgery. Exercise can be more effective by utilizing a weight in the hand of the involved side and gradually increasing the swing of the hand as a pendulum in the forward plane after eliminating gravity by forward flexion of the trunk (fig. 7). Overhead pulleys should not be used until a relative elevation of 110 degrees of the shoulder is attained.

If symptoms are not too severe, they are best treated with a sling and swathe at night, encouragement in repetition of pendulum exercises during the day, and cortisone, as recommended by Coventry, in dosages which may be 25 mg. four times daily for the first week, cutting down to three times daily the second week, twice daily the third week, and then 25 mg. daily in divided doses. This may have to be continued for a period of 8 to 10 weeks.

Causes of Referred Pain

The causes of referred pain to the shoulder are neurogenic; visceral; structural from cervical spine; postural; traumatic, involving cervical spine, clavicle, or sternoclavicular joint; or peripheral lesions. Since other members of the panel are discussing the neurogenic and the visceral types of pain in relation to shoulder conditions, we will discuss first the structural type of difficulty.

Structural Causes.—In the cervical spine, hypertrophic exostoses may narrow the intervertebral foramen and cause pinching of the cervical nerve roots. Accompanying these changes, there may be deterioration of the disks between vertebral bodies with narrowing of intervertebral spaces. This results in fixation of the involved bodies, and the vertebral body above or below the area of fixation will be found to have more motion than normal (fig. 8). This may result in a vertebral subluxation and pinching of the corresponding nerve. In addition, the degenerated cervical disk may become pushed backward and give pressure against the nerve root.

These conditions are best handled by traction on the head to relieve the pressure on the roots; cervical collar; instruction in head posture; measures which will maintain that posture, such as hard, flat bed, no pillow at night, elevated desk for reading and work, "bed specs," or "reclino specs" (prisms) for reading in bed; and exercises which will train the patient to turn or flex his head in but one plane at a time. These exercises also strengthen the cervical spine muscles and prevent fatigue and resultant faulty skeletal posture. Overenthusiastic surgeons must be cautioned against removal of a cervical disk when shoulder pain is the major complaint. Conservative measures as outlined so frequently give complete relief of symptoms; they should be continued several weeks, even in the presence of neurological signs, before a disk operation is decided on. It has been our experience to find that patients not relieved of symptoms by surgical removal of a disk were benefited by conservative measures in the way of traction, support, and exercise.

Postural Causes.—Postural causes of cervical spine lesions to be regarded are the tension syndrome and "drooping shoulder." The patient with

Fig. 7.—Method of distracting shoulder joint and obtaining flexion.

tension syndrome leads with his chin and stands with posterior neck muscles drawn taut. These patients, again, must be treated by a regimen similar to that used in those patients with structural deformity of the cervical spine. The response is always most gratifying. "Drooping shoulder" is frequently

associated with pain in the region of the superior angle of the scapula and tenderness over the attachment of the levator scapulae. Treatment by injecting the "trigger point" area with 2 cc. of 2% procaine solution, while frequently rewarding, should be supplemented to insure permanency by correction of posture and measures which will build up the musculature of the upper back, such as extension exercises and bell-bar exercises above the head.

Causes Due to Trauma.—Trauma involving the cervical spine which results in impaired motion, deformity with its resultant postural imbalance, or disturbance of nerve roots obviously may be accompanied by shoulder pain. The treatment of this is ordinarily along the lines already outlined. If instability of the cervical spine is present, surgical stabilization (arthrodesis) may be required.

Disturbance of the sternoclavicular joint by injury or disease may result in shoulder pain, with or without local pain at the involved joint. Dislocation of the sternal end of the clavicle requires surgical repair. Minor subluxations and sprains of this joint will usually respond quite satisfactorily to a period of rest, intra-articular hydrocortisone therapy, and progressive exercise starting 7 to 10 days post injury. Involvement of this joint by chronic infection or neoplasm may call for resection of the involved proximal end of the clavicle. Fractures of the clavicle of themselves rarely cause any lasting shoulder problem, provided the shoulder motion is maintained by active exercise with gravity eliminated, as outlined in the treatment of acute shoulder sprains.

Injury to the acromioclavicular joint may initiate a frozen shoulder, due to voluntary immobilization because of pain. Sprains and minor subluxations of this joint will usually respond well to brief rest, intra-articular hydrocortisone therapy, and progressive active exercise as previously described. Complete dislocation of the joint, by interfering with the outrigger support of the shoulder girdle, will result in weakness of the shoulder joint and should be surgically repaired. Degenerative joint changes that do not respond adequately to the treatment above outlined for sprains and minor subluxations may be treated by resection of the distal 0.5 in. of the clavicle, being sure not to disturb the integrity of the coracoclavicular ligaments.

Peripheral lesions of an extremity are frequently the cause of shoulder-hand syndrome. A fractured wrist or a suppurative lesion of the hand may result in a prolonged period of splinting, the arm resting in a sling. This leads to edema, tenseness of the skin, stiffness of the fingers, and a loss of shoulder motion. Accompanying this is causalgia and underlying osteoporosis of bone. A similar picture may be produced by vascular disease, such as thrombophlebitis, diffuse vasculitis, or periarteritis nodosa. The residual syndrome is not unlike that of the "frozen shoulder," and the resistance to treatment is similar.

Moberg [8] believes that this syndrome is not due to a sympathetic nervous system response, since it is almost never seen in the young, seldom in persons under 40 years of age. He claims the situation could have been prevented if the patient had been cautioned as to the necessity of using the fingers and of getting the shoulder to move from the beginning. In the majority of cases, this is true. Certainly after the condition has occurred, there is a prolonged period of disability due to the hand from contractures of the metacarpal-phalangeal lateral ligaments and due to the changes which have taken place in the shoulder joint itself. We have found on occasion that stellate block, as recommended by Steinbrocker,[9] repeated at intervals over a period of two to five weeks, results in improvement during the earlier stages.

It is important that we all teach that peripheral lesions must be treated with elevation and with the position of function of fingers and hands maintained. Active exercises of fingers must be performed as soon as possible in order to rid the hand of edema and to prevent contracture of the ligaments of the fingers. All shoulders must be carried through a range of motion at least twice daily to prevent contractures of the capsule from occurring. There is no

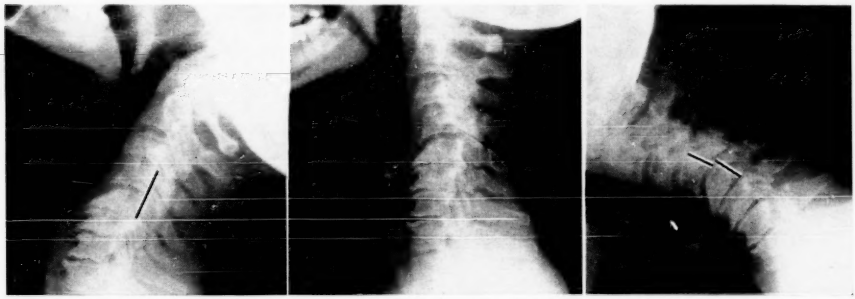

Fig. 8.—Unstable 4th cervical vertebra on fixed 5th, 6th, and 7th vertebras (to which shoulder pain was attributed in 57-year-old woman) showing, *left*, extension, *center*, neutral position, and, *right*, flexion.

glory for the physician who attains a perfect reduction of a Colles fracture and must spend six months to a year encouraging his patient to limber up stiff fingers and a "frozen shoulder."

Conclusions

The shoulder joint is dependent on tendon insertions and a balance of the scapular humeral muscles for function and stability. The early recognition of injuries to the tendinous-capsular cuff, treatment by splints or surgical repair, and management of arm injuries with elevation and neutral position of joints, followed by early graduated exercise for all joints, including the fingers of the extremity, results in early rehabilitation.

Pain may be referred to the shoulder from several body areas. The resultant splinting of the shoulder produces the same persistent "hand-shoulder syndrome" that is associated with a shoulder lesion. Management of certain cervical spine lesions by traction, supportive collar, head posture, and neck exercise has proved advantageous when shoulder pain has been the chief complaint.

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PHYSICAL TREATMENT OF THE PAINFUL ARM AND SHOULDER

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Physical therapy can be most effective in providing relief from pain in the shoulder and arm. Such treatment varies considerably, depending on the cause of pain in this area; therefore, an accurate diagnosis of the underlying pathological condition is of primary importance.

The circumstances at the time of onset of pain should be ascertained: for example, gradual or sudden onset, presence of other symptoms such as limitation of shoulder motion, and association with unusual physical activity, injury, illness, exposure to cold, or emotional upset. The patient should be questioned concerning localization of pain and factors tending to aggravate or to relieve his distress. In the examination, the physician must give special attention to the neck, shoulders, and upper extremities, noting any postural abnormality, suspicious swelling, tenderness, muscular spasm, increased warmth, abnormal sweating, and muscular atrophy.

From the Department of Physical Medicine and Rehabilitation, The Cleveland Clinic Foundation and The Frank E. Bunts Educational Institute.

Read in the Symposium on the Diagnosis and Treatment of Pain in the Shoulder and Arm before the Joint Meeting of the Section on Orthopedic Surgery and the Section on Physical Medicine at the 107th Annual Meeting of the American Medical Association, San Francisco, June 27, 1958.

Treatment of a painful shoulder should be preceded by careful diagnostic study. It is convenient to divide the pathological conditions that can cause pain in the shoulder into those that do and those that do not cause limitation of shoulder motion. Wherever feasible, physical therapy is directed toward the cause of the pain. For maximal effectiveness from physical therapy, the treatments should be administered by a fully qualified physical therapist. The physician who prescribes such treatment must exert sound clinical judgment in selecting the specific procedures to be utilized and the frequency and duration of the treatment so that the desired results can be achieved without exceeding the physical tolerance of the patient.

He must test sensation, deep tendon and superficial reflexes, and range of joint motion. Finally, he should perform certain special tests that might be

indicated, such as the outlet maneuvers, downward pressure on the vertex, and upward traction under the chin and occiput. Roentgenograms of the chest, shoulder, and cervical spine will usually be required as part of the diagnostic study.

Pathological Conditions Without Limitation of Shoulder Motion

Frequently, pain that is referred to the arm and shoulder is not caused by any direct involvement of these structures. The following conditions can be included in this category: (1) cervical radiculopathy, in which a cervical nerve root is compressed by an osteophyte, by protrusion of an intervertebral disk, or by primary or secondary neoplasm; (2) cervicothoracic outlet syndrome, in which the brachial plexus, subclavian artery, and subclavian vein may be stretched or compressed by a cervical rib, by hypertrophied scalenus anterior muscle, by enlarged transverse process from the seventh cervical vertebra, or by some other mechanism; (3) necklash injury; (4) muscular strain, in which I include the fibrositic syndrome, which is related to faulty posture or to increased nervous tension; and (5) visceral disease. The common characteristic of these five conditions is the absence of limitation of shoulder motion.

In these pathological conditions, physical therapy is directed toward the cause of rather than the area of referred pain. Treatment is of course individualized, but the programs of physical therapy can be summarized briefly as follows:

Cervical Radiculopathy.—Physical therapy is strikingly effective in relieving irritation of a cervical nerve root by a bony spur in osteoarthritis of the cervical spine. Local heat for 30 minutes and sedative massage are applied to the neck and shoulder, followed by posture training, mild strengthening of the erector spinae and the rhomboid muscles, exercises attempting normal range of neck motion, and cervical traction, applied by the Sayre head halter with the patient in a sitting position. Treatments are administered two or three times weekly in the physical therapy department for about a month; in addition, the patient is given a head halter and instructed to carry out treatments daily at home, providing another person is available to assist him. Cervical traction, which is the most important part of the program, is applied for relatively short periods (usually 3 to 5, and not longer than 10, minutes) at tensions of 25 to 60 lb. in the department (20 to 30 lb. at home). Advanced age should not be considered a contraindication to cervical traction, although traction should be applied with greater caution in elderly persons.

When there is compression of a cervical nerve root by protrusion of an intervertebral disk and there are no serious neurologic deficits, surgical decompression should not be attempted before an adequate trial of physical therapy. Frequently, such conservative treatment will provide complete relief. The program of physical therapy is the same as that outlined for cervical osteoarthritis except that treatments are given once or twice daily and the patient generally is hospitalized for closer observation.

Physical therapy is not indicated in treatment of pain from primary or metastatic neoplasm in the neck if there is some hope of cure by surgical excision or by irradiation. However, when the disease has progressed beyond this stage, radiant heat and gentle massage to the neck and upper part of the back are often effective in relieving pain. No heat should be given to areas where sensation is impaired: for example, by cordotomy or posterior rhizotomy. Caution should be used in treatment so as not further to traumatize tissue that has been irradiated.

Cervicothoracic Outlet Syndrome.—Physical therapy is the treatment preferred when there is evidence of compression of neurovascular structures in the cervicothoracic outlet, which is the region in which the brachial plexus and subclavian artery and vein leave the neck and thorax and are transmitted to the upper extremity. Many physicians now believe that no patient should be subjected to section of the scalenus muscles, removal of a cervical rib or part of the clavicle, or exploratory operation in this area without first receiving an intensive program of physical therapy for a period of one to three months.

The program of treatment consists of local heat and massage when necessary to relieve pain and muscular spasm, posture training emphasizing the so-called neutral position for the shoulders, strengthening of muscles that elevate the shoulders, and posture exercises to strengthen the erector spinae and the rhomboid muscles. Patients with outlet syndrome should be cautioned not to sleep with their arms above the head and to avoid activities that aggravate their symptoms. After such a program of physical therapy, only a small percentage of patients will require surgery.

Necklash Injury.—In necklash injury, which frequently results from rear-end automobile collisions, the patient occasionally complains of pain radiating from the neck into the shoulder and arm. Physical therapy should be part of a program of symptomatic treatment and reassurance by the physician designed to avoid a crippling psychological fixation that can occur in some cases in which there is compensable injury and fear of progressive disability. For this reason, physical therapy should be instituted as soon as possible after the injury. The program includes local heat, sedative massage, posture training and exercises, normal range exercises for the neck emphasizing relaxation, and cervical traction.

Typically, treatments are scheduled in the physical therapy department two to three times weekly for one or two months. Toward the end of this period the frequency of treatment is gradually reduced, but the patient is instructed to continue a program of therapy at home. It is important not to overtreat these patients. They should be urged to settle any pending litigation within a reasonable period, for example, 18 months.

Muscular Strain.—Increased thoracic kyphosis, sloping shoulders, and forward position of the head are postural faults that can cause chronic muscular strain resulting in a dull aching pain radiating from the neck into the shoulders and upper part of the back. Nervous, anxious persons often unconsciously tense muscles in this area; prolonged muscular contraction frequently results in tension myalgia, or the so-called fibrositic syndrome, that characteristically becomes more severe later in the day and during periods of emotional stress. In muscular strain due either to faulty posture or to increased nervous tension, physical therapy can be of considerable help. Treatment consists of local heat; massage; posture training; exercises to strengthen the erector spinae, the rhomboid, and the shoulder elevator muscles; and exercises to increase relaxation in the neck and upper part of the back.

Visceral Disease.—When pain in the shoulder and arm is caused by disease in the thorax or in the abdomen, and there is no limitation of shoulder motion, physical therapy obviously can be of no help and is, therefore, not indicated.

Pathological Conditions with Limitation of Shoulder Motion

Pain in the shoulder and arm associated with limitation of motion is found in many cases in which there is primary or secondary pathological involvement of the musculoskeletal or soft-tissue structures in the shoulder girdle. These pathological conditions can be listed as follows: (1) periarthritis, which includes calcific peritendinitis, rupture of the rotator cuff, the bicipital syndromes, and bursitis; (2) shoulder-hand syndrome, which is a reflex sympathetic dystrophy, caused by a wide variety of conditions, such as causalgia and myocardial infarction; (3) arthritis (most commonly rheumatoid arthritis, rarely osteoarthritis); (4) contractures due to immobilization (for example, after application of cast, radical mastectomy, or paralysis); (5) acute trauma (sprain, fracture, or dislocation); (6) peripheral neuropathy (having a toxic, herpetic, or traumatic cause); and (7) miscellaneous (infection, neoplasm).

When physical therapy is indicated in these conditions, it is directed primarily to the shoulder and arm for the purposes of relieving pain and muscular spasm, of improving circulation and local tissue metabolism, and of restoring range of joint motion, muscular strength, and function in the upper extremity. In the various types of periarthritis, in shoulder-hand syndrome, in rheumatoid arthritis or osteoarthritis, and in contractures after immobilization, very similar programs of physical therapy to the shoulder are followed: local heat, deep stroking and kneading massage, active and active assisted exercises, and gentle stretching to increase range of motion, posture training, and posture exercises.

In patients who have extremely painful limitation of shoulder motion, a special type of active exercise, first described by Codman, is often given. The patient bends slightly forward at the waist and swings his arm like a pendulum first in clockwise, then in counterclockwise, rotary motions, gradually increasing the arc of movement as tolerated. Frequently, the program is supplemented with exercises utilizing the shoulder ladder and overhead pulley and with occupational therapy directed toward increasing functional abilities, muscular strength, and coordination.

In some cases of acute periarthritis and in acute trauma to the shoulder, when there is evidence of bleeding into the soft tissues, cold is applied to the shoulder in the form of either moist cold compresses or an icebag. In peripheral neuropathy, local heat is not usually effective and may make the patient more uncomfortable; if sensation is impaired, heat of course must not be applied. In an acute infection, such as a thrombophlebitis, warm moist compresses are helpful, but massage and exercises to the involved areas are contraindicated. No physical therapy is given when there is neoplastic involvement of the shoulder or arm.

Factors Involved in Effective Physical Therapy

Frequently, the question is asked: "Which form of heat is most effective?" Perhaps in the past, too much importance has been attached to the specific type of heat utilized. Actually, heat is the same, regardless of the source; whether it is emitted from hot water, an electric pad, diathermy cables, the sun, or a heat lamp, heat is simply energy that can increase molecular motion.

Considerations that should determine the specific form of heat to be used in a given situation are as follows: depth of penetration desired, subjective response of patient, availability of source, and safety in application. Sources of rather limited penetration are radiant heat (luminous infrared heat lamp, nonluminous coil heater) and conductive heat (hot water bottle, hydrocollator pack, electric pad, and hot moist pack). When the patient is expected to follow a home program of treatment, the luminous infrared heat lamp presents many advantages; it is inexpensive, very safe to use, simple to operate, and readily available at any electrical appliance store. If the patient objects to the glare from such a lamp he should be instructed to buy one made of red glass. He should be cautioned not to purchase a sun lamp, which emits considerable ultraviolet radiation; 30 minutes exposure to such a lamp will result in a serious burn.

Contrary to the general public's impression, the electric pad is a potentially dangerous source of heat because patients frequently apply it for long periods; serious burns, even when the pad is set on "low," have resulted when the person using this device falls asleep. After a few years, the insulation covering the wires in an electric pad cracks, resulting in short-circuits with electric shock and fire hazards. Actually, the hot water bottle or hydrocollator pack is preferred to the electric pad as a convenient and safe form of heat application for use in the home.

Sources providing deeper penetration of heat are short-wave and microwave diathermy. If the patient is able to come in for a series of treatments in the physical therapy department, diathermy is given in preference to other forms of heat because of its depth of penetration. If the area of discomfort is localized, microwave diathermy can be applied most conveniently. If the discomfort is more generalized over the neck, upper part of the back, shoulder and arm, short-wave diathermy coils can provide more effective, uniform heating.

In recent years, ultrasonic diathermy has come into general use in departments of physical therapy. This is a type of vibrational energy of high frequency which causes selective heating at interfaces within a body. Its exact role in the treatment of various pathological conditions causing pain in the shoulder and arm is still not completely clear. However, there is evidence that it is helpful as an adjunct in the treatment of periarthritis of the shoulder and causalgia.[1] When given, it is applied for periods of 5 to 10 minutes at intensities up to 1.5 watts per square centimeter, utilizing the so-called stroking technique; the application should be followed by massage and exercises such as those described previously.

For maximal benefit from physical therapy, the treatments should be given by a fully qualified physical therapist. The physician who prescribes physical therapy must exert sound clinical judgment in selecting the physical procedures to be utilized and the frequency and duration of treatment so that the desired results can be achieved without exceeding the physical tolerance of the patient.

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POTENTIAL FOR REHABILITATION IN QUADRIPLEGIC TEEN-AGERS

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The extent of recovery and rehabilitation after quadriplegia has been studied in 12 patients, 8 of them victims of accidents with motor vehicles. Three detailed case histories illustrate the difficulties encountered and the extent of self-care, educational attainments, and vocational prospects found in these patients. Although adolescence is a pivotal experience it is possible to give young people a reliable new scale of values and a serenity of spirit. The level at which the spinal cord was injured is all-important in deciding the prognosis. The second consideration is early expeditious comprehensive therapy. The third consideration, age, favors the adolescent in that he is more cooperative than young children and less hampered by ingrained traits than the aged. He must cooperate in giving attention to his skin and urinary and neuromuscular systems, and, above all, he must learn to rely as much as possible on his own capabilities.

The potential for rehabilitation in patients with high spinal injuries is directly related to the extent of cord severance as well as to adequate management.[1] In the past a majority of patients with such injuries have been 20 years of age or older, but of recent years much younger quadriplegics are being admitted for rehabilitation services.[2] Because of an elevation in the birth rate, increasing recreational pursuits, and the rising number of automotive accidents these disabilities are expected to become more numerous.

Teen-agers have a potential for adjustment and growth which will never again be as great in terms of rehabilitation. Their pattern of development during these critical years determines their place in the adult working world. Neglect during this pivotal experience point may create physical and emotional maladjustments which can be costly to the individual and to society, but in view of the current advances in physical medicine and rehabilitation, we can give these boys and girls a reliable new scale of values and serenity of spirit.[3] The money we spend on fitting them for years of useful living gives recognition to the capacities of all our disabled citizens, young as well as old.[4]

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Read before the Section on Physical Medicine at the 107th Annual Meeting of the American Medical Association, San Francisco, June 25, 1958.

Patients Studied

In a two and one-half year period, 12 patients with cervical cord transections were followed by personnel in the department of physical medicine

at the University Hospitals of the University of Oklahoma School of Medicine. All the disabilities sustained were traumatic in origin; their causes were automotive accidents (eight), diving injuries (two), fall from window (one), and trampoline accident (one). Two, or 17%, were female, of whom one was an adolescent, and 83% were male. Six, or 50%, were patients in their teens. The adults were used as a comparative group in terms of their rehabilitation potential (see table). Each patient was seen on consultation as soon as he could be referred from either the orthopedic or the neurosurgical services. After a thorough physical medicine evaluation, including social and psychological assessment, definitive rehabilitation programs were prescribed for them.

In this paper quadriplegia is used to mean the permanent partial or total paralysis of those spinal cord elements affecting the upper limbs in addition to paralysis of the lower extremities. Since the lower fibers of the brachial plexus consist largely of the anterior division of the first thoracic nerve, injury to this portion of the cord was considered as producing a quadriplegic disability.

The table lists six teen-age quadriplegic patients. Their ages range from 14 to 19 years. Five patients were male and one female. Spinal cord level of injury was as follows: C-4,5, one (17%); C-5,6, four (66%); C-8 to T-5, one (17%). It is interesting to note that the majority of injuries (66%) were at the C-5,6 level and were sustained during the warm weather months. One teen-ager with a level of injury involving a wide section of the spinal cord has been included in the series because of the cervical involvement. However, since the main damage occurred at the T-5 level, his potential capacity for rehabilitation was better than the others. For simplicity, complications have been indicated under three headings: urinary infection, decubitus ulcers, and contractures. Potential, as indicated, for the quadriplegic teen-agers is in four categories: negligible, poor, fair, and good. "Negligible" meant that the prognosis was exceedingly doubtful; "poor," that complications were present and that the patient was confined for the most part in bed and was able partially to feed himself; "fair," that there were few complications, wheel chair mobility was possible, and the patient was almost independent in feeding himself; "good," that there were no complications for at least three months and that the patient could use a wheel chair moderately well, was able to feed himself, and could stand in braces and crutches.

It is rare for quadriplegics to ambulate for any distance. Teen-agers with fair to good potential can continue their education at high school, college, or through correspondence courses and have an optimistic outlook in terms of a vocation. All but one of our teen-age patients had the use of a wheel chair, two were able to use braces and crutches, and all had some degree of self-care ability. One patient who was injured in 1954 was practically homebound but could manage to spend a few hours in his wheel chair. Our single female teen-ager was obese and failed to cooperate in controlling her diet. Consequently she developed decubitus ulcers which necessitated plastic surgery on two occasions.

A comparable group of adults had also been admitted during this period. The one female patient in this group had a complete transection of the cord which made her helpless below the shoulder level. In view of her respiratory difficulty and the presence of complications her prognosis was considered doubtful. Poor potential in the adults was due primarily to the presence of urinary infection, bedsores, and contractures. Those adults rated fair had relative freedom from complications, were mobile in a wheel chair, and could stand with braces and crutches.

Data on Twelve Patients with Cervical Cord Transections

Case No.	Sex	Cervical Level	Date of Onset	Cause of Accident	Age	Urinary Infection	Bedsores	Contractures	Potential	Results to Date
					Teen-agers					
1	M	4,5	July, 1957	Diving	15	0	0	0	Fair	Wheel chair, partial self-care, e. g., eating
2	M	5,6	May, 1957	Trampoline	17	0	0	0	Good	Wheel chair, braces/crutches, partial self-care, e. g., eating
3	M	5,6	Jan., 1956	Auto	19	0	0	0	Good	Wheel chair, braces/crutches, partial self-care, e. g., eating
4	M	5,6	June, 1954	Auto	19	+	+	+	Poor	Homebound, bed, wheel chair, partial self-care, e. g., eating
5	M	8-T5	Oct., 1955	Motorcycle	14	0	0	0	Good	Wheel chair, braces crutches, ambulatory
6	F	5,6	May, 1955	Auto	16	+	+	0	Fair	Wheel chair, partial self-care, e. g., eating
					Adults					
7	F	4,5	April, 1957	Auto	25	+	+	+	Negligible	Completely helpless, bed, breathing difficulty
8	M	5,6	Aug., 1957	Auto	49	+	+	+	Poor	Homebound, bed, wheel chair, no self-care
9	M	5,6	June, 1956	Diving	23	+	+	+	Poor	Homebound, bed, wheel chair, no self-care
10	M	6	June, 1957	Fall from window	40	0	0	0	Fair	Wheel chair, braces/crutches, ambulatory
11	M	6,7	Nov., 1956	Auto	63	+	0	0	Fair	Wheel chair, braces/crutches, partial self-care, e. g., eating
12	M	6,7	May, 1957	Auto	44	+	0	0	Fair	Wheel chair, partial self-care, e. g., eating

Determining Rehabilitation Potential

After the physical examination certain physical assessments were needed before setting up a rehabilitation goal: (1) motor function—manual muscle test; (2) sensory levels—charting of dermatomes; and (3) performance activities—"daily living" test. These tests served as objective guides to the extent of disability and later on to the progress made during the course of treatment. In order to determine suitability for functional rehabilitation, the following additional medical considerations had to be examined.

Extent of Injury.—Where orthopedically and neurologically indicated, stability had to be restored to the spinal vertebrae by fusion or bracing. The assurance of spinal stability then permitted maximal activity programs.

Condition of Bladder and Intestines.—The level of bladder and bowel function was a basic element in rehabilitation of the patient with spinal cord injury.[5] Stones in the kidney or bladder had to be removed. In addition, where catheterless (automatic or reflex) bladders could be made to function, potential for rehabilitation was considerably elevated. Other considerations such as leaking catheters, particularly in females, required attention, as these can create much reluctance to cooperate in any training program. Control of bowel function is also of major importance. Unless trained to empty regularly they may become an obstacle preventing recovery.[6]

Decubitus Ulcers.—Presence or absence of bedsores is a most significant factor in developing rehabilitation potential.[7] Physical medicine therapy becomes severely restricted, particularly when large single or multiple decubitus ulcers necessitate positional nursing care and extensive skin hygiene.

Psychological Attitude.—In cases where the patient did not wish to get well, or failed to cooperate, rehabilitation had to be delayed until motivation was restored. Assistance from the psychiatrist was essential. In evaluation of educational levels and vocational aptitudes, psychometric analysis was needed, particularly if realistic goals were to be established.[8] Typical management of a case is described in detail below, as well as summaries of two other cases.

Report of Cases

Case 5.—This 14-year-old male student was admitted to the hospital on Oct. 13, 1955, with a diagnosis of spinal cord injury at the level of C-8 to T-5, with compression fracture at T-5; disability: quadriplegia. He had been injured in a motorcycle accident on Oct. 12, 1955. He was unable to move his lower limbs and had impaired finger function bilaterally. Bladder and bowel control had been lost. Laminectomy was performed at Children's Memorial Hospital soon after admission.

Physical medicine examination revealed a spastic paralysis in the lower limbs and hyperactive reflexes with ankle clonus. There was fairly good muscle strength in both upper limbs, but impaired function was noted in the fifth fingers of both hands. Some strength was present in the upper abdominal muscles. The patient required an enema every other day for bowel emptying, and an indwelling catheter. Sensation was present to approximately just below the nipple line. No decubitus ulcers were noted. He would require a comprehensive program of physical medicine and rehabilitation. Self-care activities were to be encouraged, including a bowel and bladder control program. During this period it was recommended that a standard wheel chair of the collapsible type be prescribed for him, with hand brakes, 8-in. front wheel casters, heel strap, footrest, sponge rubber seat cushion, and removable arms. Because of the high lesion he would need bilateral long leg braces with pelvic band and perhaps a modified type of spinal support. Our evaluation committee on rehabilitation scheduled him for early consideration by the various disciplines concerned. The evaluation committee's report was as follows:

Physical Therapist.—Treatment was begun on Nov. 28, 1955, consisting of strengthening exercises of the upper limbs with progressive resistance and ranging of joint motions of the lower extremities. By Jan. 13, 1956, he had improved in his wheel chair activities, getting into bed and from bed to the wheel chair, propelling wheel chair, going in and out of doors, starting, stopping, and locking and unlocking brakes. He was also able to get from the chair to the toilet. On Jan. 18, 1956, he started working on the mat, getting from the chair to the mat and back to the chair, doing pushups, rolling, sitting, balance and flexibility exercises, and taking socks off and putting them back on again. At the present time he is capable of taking care of himself from the standpoint of activities of daily living.

Occupational Therapist.—The occupational therapy program consisted of evaluating his inherent self-care activities and giving a functional prescription to improve his muscle strength in the upper limbs. All dressing activities and the use of tools were encouraged.

Psychologist (Psychometric Analysis), Feb. 16, 1956.—A Wechsler-Bellevue (full scale, form 2) yielded the following results: verbal scale I.Q.:88; performance scale I.Q.:95; full scale I.Q.:90. This would place the patient in the average I.Q. range. Test scatter was rather small, indicating an even level of performance with no bright spots and no striking weaknesses. He was somewhat poorer in those tasks which might be characterized as academic or conceptual.

According to the Kuder Preference Record (form C), the patient's highest peak occurred on scale 8, the social service scale, and here he was at about the 98th percentile. Next was the mechanical scale on which he scored at the level of the 85th percentile. His lowest scores occurred on the clerical and artistic scales, on both of which he was at about the 8th percentile. It should be emphasized that at this age one would not necessarily expect a full crystallization of interest and interest patterns. Certainly it ought to be recommended that his Kuder record be considered in the light of this fact; further testing is indicated on subsequent occasions when vocational choices must be made more definitively.

On the Minnesota Multiphasic Personality Inventory (MMPI), all scale scores were within the normal range and indeed no single scale elevation went beyond a standard deviation. One of the interesting things about this was that it seemed to reflect so little the psychological repercussions of the state of affairs brought about by the accident. One would ordinarily expect in so drastic an accident something more in the way of a depressive affect; however, none was manifested at this time.

Social history indicated that he was one of six children and had always attended school regularly. He had a normal interest in school and in sports. In addition he worked on a paper route. Although the patient had given some thought to his future, he did not know what he wanted to do. The

patient was extremely anxious to visit his brothers and sisters. After a visit home for a week-end his anxiety was relieved and he was able to settle down to his treatment.

Vocational Counselor.—The State Vocational Rehabilitation Division was anxious to cooperate in this youngster's vocational rehabilitation. However, it was felt that he should continue his education. When this has been satisfactorily completed, he will become a good prospect for rehabilitation and the vocational rehabilitation agency will be happy to accept him as a client. The Okmulgee Rehabilitation Center will also assist in this vocational training so that he can be prepared for remunerative employment.

Potential to June 1, 1958.—Follow-up on this patient has revealed ambulatory ability with braces and crutches and complete independence in self-care and toilet. He plans to

Fig. 1 (case 1).—Quadriplegic patient with involvement at C-4,5 standing with aid of tilt-table. Close-up, view of functional arm assistive aid.

graduate from high school and then enter the Okmulgee Rehabilitation Center for vocational training. He is interested in radio repair work and is being encouraged in this direction. What his ultimate potential may be cannot be predicted. However, as with all disabled persons, capabilities have to be tried in actual situations, and for an indefinite period, for valid conclusions to be drawn.

Case 1.—This 15-year-old male student was admitted on June 7, 1957, with fracture dislocation at C-4,5 and spinal cord injury; disability: quadriplegia. On June 7, 1957, the patient had dived into a country club swimming pool and had to be pulled out. Apparently he had struck the bottom of the pool. He was completely paralyzed from the neck down. X-ray revealed a fracture of C-4,5 with forward dislocation of C-4. Sensory loss was to just above the nipple line. There was some use of the biceps muscles from the motor aspect. The Queckenstedt test showed no block of spinal fluid, but the fluid was bloody. Fifteen pounds of cervical traction was applied by means of Crutchfield tongs. During this period the patient developed signs of cyanosis. He was operated on on June 11, 1957, because of deterioration in his general condition. Before the dura was opened, considerable tissue degeneration and the presence of extradural fat was noted. The cord appeared ecchymotic and edematous with a spindle-shaped swelling at the level of C-4,5. Complete fractures at the bases of the laminae were seen, but without wide separation. A decompression was then performed and the dura left open to relieve pressure. A bone graft, taken from the right tibia, was inserted as an "H-block" between C-3 and C-6 with wire about the spinous processes.

Tongs traction was removed on July 28, 1957, and he was transferred to Children's Memorial Hospital on Aug. 5, 1957, for physical medicine and rehabilitation. After approximately one year of intensive comprehensive therapy, the following capacity had been developed.

Potential to June 1, 1958.—The patient can spend a full day in his wheel chair, to receive physical or occupational therapy, to engage in diverse recreational pursuits, or to receive schooling from his teacher (fig. 1). On the week-ends he is able to go out for automobile rides with his parents. An indwelling catheter as well as a leg urinal is required, since an automatic bladder has not been developed as yet. Bowels are controlled by an enema every other day. A practical nurse is needed daily for skin hygiene and toilet. He is able to feed himself with a right upper extremity brace and functional aids. He can roll a wheel chair at least 25 yd. unassisted, but cannot lock its brakes. He types with an electric typewriter. His studies have been maintained with the help of a teacher assigned by the state board of education. Our plans are to allow him to graduate from high school along with his regular schoolmates. Social, psychological, and vocational assessments have been made with follow-up interviews.

Laboratory tests gave the following results: Urinalysis revealed presence of Proteus vulgaris; creatinine level was 1.08 Gm. per 24 hours; creatine level, 0.371 Gm. per 24 hours; 17-ketosteroid level, 7.8 mg. per 24 hours (Klendshoj method) (normal for men: 8-17; for women: 6-14); 17-ketosteroids (mg.) divided by creatinine (mg.) = 7.22 (normal = 10). (Testosterone propionate in oil (100 mg.) had been injected intramuscularly every five days since Aug. 6, 1957.) The white blood cell count was 9,900 per cubic millimeter, with 66% mononuclear leukocytes, 33% lymphocytes, and 17% eosinophils; hemoglobin level was 15.0 Gm.; calcium level, 10.2 mg. per 100 cc.; phosphorus level, 5.2 mg. per 100 cc.; and creatinine level, 0.89 mg. per 100 cc. There was no evidence of calculi in the urinary tract or bladder.

Case 2.—This 17-year-old male student was admitted on May 9, 1957, with dislocation at C-5,6 and spinal cord injury; disability: quadriplegia. The patient was admitted to St. Anthony's Hospital after an accident on the trampoline. His neck became acutely flexed, but consciousness was not lost. He developed an almost immediate loss of feeling and motor power in all four limbs. His weight was 175 lb. (79.4 kg.). After the injury, sensation was present to just below the clavicle anteriorly and somewhat higher posteriorly. X-rays revealed a complete dislocation of C-5,6 without fracture. Crutchfield tongs were applied to the skull and 12 lb. of traction used after reduction. He was operated on on June 18, 1957. The interspinous ligament was found to

be severely disrupted, but no fracture was evident. Heavy stainless steel wire was run through a small hole in the process of C-6 and a graft from the tibia was applied bilaterally to the two vertebrae. The Crutchfield tongs were removed July 19, 1957, and a neck brace was applied to permit the patient to sit up. Transfer to Children's Memorial Hospital was made on Aug. 5, 1957, for physical medicine and rehabilitation.

Potential to June 1, 1958.—The patient is able to propel the wheel chair unaided except for curbs and ramps. When placed in braces, he is ambulant for short distances. Braces have been prescribed primarily for their physiological and psychological effects (fig. 2). He can feed himself but requires toilet attendant care. With some assistance he can move to a wheel chair from the bed and back again. Assistive aids make communication activities possible. He plans to attend Oklahoma University full time with a companion student and is interested in studying law and accountancy.

Pertinent laboratory data include the following findings: Proteus vulgaris organisms were present in the urine; creatinine level was 1.07 Gm. per 24 hours; creatinine level, 0.09 Gm. per 24 hours; 17-ketosteroid level, 9.2 Gm. per 24 hours (Klendshoj method) (normal—men: 8-17; women: 6-14); 17-ketosteroids (mg.) over creatinine (mg.) = 8.60 (normal=10). (Testosterone propionate in oil (100 mg.) had been injected intramuscularly every five days since Aug. 6, 1957.) Blood cell count and chemistry tests yielded the following results: white blood cell count, 8,500 per cubic millimeter, with 55% mononuclear leukocytes, 37% lymphocytes, and 8% eosinophils; hemoglobin level was 16.6 Gm.; calcium level, 10.5 mg. per 100 cc.; phosphorus level, 4.9 mg. per 100 cc.; and creatinine level, 1.3 mg. per 100 cc. There was no evidence of calculi in the urinary tract or bladder.

As seen from our typical findings, the metabolism of these youths conformed to fairly normal limits; the excretion levels of creatine and creatinine were satisfactory, the urinary 17-ketosteroids mirrored adequate testicular and adrenal cortical hormones, and the calcium and phosphorus blood levels were excellent evidence of our intensive mobilization program. Other than the continued presence of Proteus vulgaris in the urine, genitourinary infection was no particular problem.

Comment

When spinal cord involvements affect the upper elements of the brachial plexus and diaphragmatic innervation, basic musculature for survival and self-care is lost, and any potential for rehabilitation becomes negligible. A patient's only hope is for domiciliary nursing care. Consequently, in making a prognosis for a quadriplegic patient the level of spinal cord interruption is all-important.[9] The second consideration relates to early expeditious comprehensive therapy. Most authorities appear to agree on this aspect of management.[10] The third important factor is a patient's age. The very young lack insight and cooperate uncertainly. The adult and aged usually have ingrained modifying psychological traits which are unpredictable.[11] The teen-aged group offers rich soil for rehabilitation measures.

The impact of prolonged hospitalization on the teen-ager living in a therapeutic environment with nursing personnel and physical and occupational therapists creates dynamic factors which can bring to bear long-lasting motivating corrective influences. On the whole, the anxiety and guilt feelings of the parents do not appear to disturb these adolescents greatly. When a rational program of rehabilitation is explained and initiated, teen-agers respond comparatively well to improving themselves. They integrate data from all sources and the emotional attitudes which are derived come chiefly from the staff. Attachments, if any, are mainly directed to the institution and its personnel.

Fig. 2 (case 2).—Quadriplegic patient with involvement at C-5,6 standing with braces and crutches.

Psychology of the Teen-ager.—The era comprising the teens is generally a period of problems normally. Along with growth and development the years of puberty are complicated by new emotions, new desires, and new-found freedoms. Emergence from immaturity to maturity may provoke a whole series of conflicts. This graduation from dependence to independence is a natural fulfillment of individual endeavors. The teen-ager unfortunate enough to have a high spinal cord trauma and severance is, therefore, in a most disadvantageous position. Because of the remoteness from parental influences, relationships with the opposite sex may be disrupted. It has been said that spinal cord injury can create all types of psychic activity, on both the conscious and unconscious levels.[12] Thus far, it has been our experience, surprisingly enough, that the physical impairment has a mitigating effect on the personality.

During a teen-ager's early formative years his personality development depends to a large extent on experiences within the family. Parents may have preconceived attitudes toward disabled people which are reflected in their children's views. However, in general, the age when disability occurs, particularly in quadriplegia, shapes the nature of attitudes concerning the future. A normal adolescent is imaginative but rarely understanding regarding situations and emotional problems. Most of us have an escape from any hurt in this developmental phase of life through other interests, but the quadriplegic teen-ager does not. He enters a period of social conflicts with insufficient outlets. Physical manifestations of bodily dysfunction also become hidden.

It is said that body image is generally incorporated into our psychic make-up at an early age. It is only later, when the perception of the external body becomes pronounced as at the prepuberal or puberal levels, that teen-agers become moved by the profound psychic forces within them. Since the integration of a physical disability takes considerable time to become formulated into a body image, the adolescent usually does not have time to become depressed. In a program of intensive physical restoration the body image is relegated to the background and attention is directed to rehabilitation activities. Only when recreational or vocational pursuits are encountered does the significance of certain bodily functions become psychologically important for these patients. How these areas and functions become important may be guided by the early experiences in rehabilitation training as well as by basic psychological needs. Misdirected efforts and poor physical medicine programming may create psychological upsets which can be overwhelming even to a normal individual. Body image disruption also may become pronounced through the development of decubitus ulcers, urinary infection, and other complications.

In adults, the total personality adjustment is shaped more directly to the personal psychological view of the paralysis.[13] Adults, too, may or may not be objective in viewing their paralysis. While, on the one hand, some will relate the destruction of the body to a punishment from above, others will accept the inevitability of the situation and strive to adjust to their disability. The teen-ager apparently does so with relative ease.

Potential Functional Goals.—With appropriate therapy, many activities are within the range of the quadriplegic patient. With involvement at the C-4,5 level, feeding, page-turning, sanding, typewriting (electric), brushing teeth, and propelling a wheel chair are possible with assistive aids. Nose-scratching and sitting in wheel chair require no aids. With involvement at the C-5,6 level, use of electric razor, smoking, use of zipper, writing, turning over in bed, transferring to and from bed to wheel chair with horizontal bar, and use of ordinary typewriter are possible with assistive aids, and the patient can stand in braces with crutches unaided. With involvement at the C-6,7 level, the patient needs no aids to use fingers and wrists, crutches, telephone, tools, and office machines and can partially dress himself. With involvement at the C-8 to T-1 level, the patient has full use of wheel chair, full upper limb functioning, and can perform the following activities unaided: dressing, undressing, radio repair, and carpentry. The patient is ambulatory (with braces and crutches), and can drive a car.

Our studies have indicated that if use is made of every available residual function, particularly in the younger patient, certain self-care and wheel chair activities become possible. For example, our patients were able to sit in a wheel chair and by means of special knobs and studs attached to the hand rims could achieve a degree of self-care mobility. One of the youths with involvement at the C-5,6 level was able to stand unaided with bilateral long leg braces, modified Knight spinal type of attachment, and the use of crutches. Needless to say, braces are prescribed primarily to achieve the physiological benefits of standing and not for any major degree of ambulation. It is felt that these persons cannot, with safety, be permitted to walk unaided and, therefore, the security of a wheel chair is needed at all times.

Urinary Infection.—In our studies, urinary infection was the most common complication, as was to be expected. However, after the first few flare-ups and until bladder routine could be learned, the management program appeared to control this problem rather well, particularly with the teen-age group. It was found that infection usually developed as a result of carelessness or not conforming to instructions. In one case, a Foley catheter was inflated within the urethra and produced a

periurethral abscess. Apparently frequent changing of the catheter did not provoke as many infections when strict asepsis was maintained. Foley catheters were used routinely and tidal drainage was very helpful in managing our teen-age patients. The soluble sulfonamides and other antibiotics were able to control these urinary infections; however, no attempt was made to keep the urine sterile. As indicated in the laboratory data, Proteus vulgaris was found frequently. The other typical findings reflected the health of these youths. Unfortunately, most of these tests were not performed in the adults. We were fortunate that on only two occasions during the 12 months were our teen-agers absent from the physical medicine department because of elevated temperature. Contrary to what was expected, our female teen-ager had more difficulty than the males with bladder infection. In her case it was believed that this was due to the injury being sustained several years prior to the establishment of adequate treatment. She also required removal of several calculi from the bladder in addition to plastic repair for bedsores.

Decubitus Ulcers.—Decubitus ulcers are preventable in most quadriplegic patients if good nursing care is available.[7] Our adult patients developed bedsores because they were treated without a Stryker frame and with insufficient attention being paid to the skin. We found the Stryker frame to be the most efficient nursing aid during early rehabilitation for teen-agers. Not only does it permit easier nursing and transportation by a single nurse but it also makes it possible for the youth to attend movies and other recreational pursuits with facility.

In the early phases of nursing management, each patient was turned day and night every two hours. This is mandatory. Later, a prone position was encouraged for reading and study purposes. However, as strength in the back muscles became pronounced, a wheel chair was used more frequently during the waking hours. In order to maintain the condition of the skin, patients were impressed with the fact that frequent movement of a rocking nature was necessary in order to prevent isolated pressure points on the skin. If this was impossible, assistance by a nurse or attendant or with a hydraulic lift became necessary.

After six months we found that the nutrition of the skin was well maintained particularly when the protein and vitamin intake were kept at a high level. It was noticed that the skin turgor and circulation did not appear grossly different than that observed in normal skins when the above routine was followed. Muscle atrophy, seen in many paraplegics, also was not as evident under these circumstances, which is an interesting observation for further investigation. There appeared to be a tendency for teen-agers to put on weight; consequently, the weights were recorded repeatedly. Excessive perspiration was present, particularly during the early months, but later appeared to become more normal.

Contractures.—Active and passive therapeutic exercises embodying all the principles of basic physical medicine will minimize the development of contractures. Assistive aids, such as a functioning footboard and braces, contribute greatly to such prevention. Since muscle imbalance resulting from the paralysis is the underlying cause of muscle shortening, retraining measures employed in rehabilitation have been found to be most satisfactory. No contractures were noted in any of our teen-agers except for our homebound patient. Half of our adults manifested impaired joint ranges not only in the lower limbs but also in shoulder, elbow, wrist, and finger joints. These became limiting factors in the development of rehabilitation potential.

Mental Attitude.—It has been said that paraplegic patients, in the teens and twenties usually become depressed during the third and fourth week after injury. We have not found this to be true in our teen-age group. Perhaps this is due to the fact that an adolescent is still in the process of development. The few functioning muscles such teen-agers possess can be developed through prescribed exercises. Since our aim is to approximate the individual to a way of life as nearly normal as possible, we believe that even assistance in the adaptation to a "wheel chair life" is worthwhile; such youths can become dexterous in the use not only of the wheel chair but also of other assistive devices. As soon as feasible, psychomotor orientation should be given to shift the thinking from the paralyzed to the normal parts of the body.

Muscle Rehabilitation.—The important muscle innervations by spinal cord levels are as follows: at the C-2,3 level, the sternocleidomastoid, trapezius, neck extensor, and part of the erector spinae muscles; at the C-3,4 level, the diaphragm and trapezius muscles; at C-4,5 level, the rhomboid, diaphragm, supraspinatus, infraspinatus, and portions of the subscapularis, deltoid, teres, biceps, pectoralis, and serratus muscles; at the C-5,6 level, the subscapularis, deltoid, biceps, teres, serratus, brachioradialis, supinator, extensor communis digitorum, pronator teres, flexor carpi radialis, and portions of the latissimus dorsi, triceps, extensor carpi radialis, opponens pollicis, abductor and flexor pollicis muscles; at the C-6,7 level, the latissimus dorsi, triceps, carpi extensor, opponens, and portions of the carpi flexor and lumbricales (lateral) muscles; at the C-7,8 level, the carpi flexor, interossei, and pectoralis muscles; and at the C-8 to T-1 level, the carpi flexor, lumbricales (medial), and part of the erector spinae muscles.

Particularly in the spinal cord lesions above T-1, re-education of these muscles should be stressed. With exercise the trunk muscles, especially the latissimus dorsi, depressors, and elevators of the shoulder, the scapulae stabilizers, can be enhanced and marked functional capabilities developed. The latissimus dorsi, which is supplied from as high as C-6 to C-8, is bypassed by most C-8 to T-1 lesions and can serve as the medium for connecting the paralyzed portion of the body to that which is normal. Another powerful back muscle which maintains the patient in an erect position is the erector spinae, supplied from C-1 to C-3. Lesions below T-1 permit a patient to sit and stand erect by using muscles above this level. The triceps muscles are innervated from C-6 to T-1 and are essential for walking on crutches. Those with injuries of the spinal cord find this muscle most useful when developing rehabilitation potential. The rectus and oblique abdominis muscles are supplied from T-5 to T-12 segments, and when their functions are lost a corset support is often required.

In the compensative retraining of muscles, an intensive program of graduated progressive resistive exercises for the upper extremities is prescribed. Systematic training of these muscles will result in increased power and will enable the youth to maintain the upright position first in sitting and then perhaps in standing. Since postural sensibility is also impaired, balance becomes precarious. Only through training can the visual and postural senses be enhanced to the point of security.

Self-care and Assistive Aids.—Since a quadriplegic teen-ager has to be prepared for the future and for personal responsibilities, he must be taught to eat and drink and to dress himself if at all possible. Also it would be advantageous for him to be able to hoist himself onto the bed or into the wheel chair, with or without assistive devices. He must also assume the responsibility of caring for his skin, as prolonged pressure while in the wheel chair can lead to bedsores. He should acquire the habit of changing positions at regular intervals. He must avoid accidents such as burns or injuries to his paralyzed extremities and substitute with his eyes for sensation loss. It is not intended that a quadriplegic walk for any distance, but development of ambulatory ability can provide him with a means of getting to and from the toilet and meeting similar situations. Above all, he must become reliant on his own capabilities wherever feasible.

Summary

With an increasing accident rate, spinal cord injuries are becoming more prevalent. These severe disabilities are now being seen in the teen-age group and at higher cord levels. Potential for rehabilitation is better in teen-agers than in adults. For achieving success, prompt comprehensive physical medicine and rehabilitation effort is necessary. Utilization of the modern techniques of rehabilitation, with meticulous attention to the skin and to the urinary and neuromuscular systems, makes a useful social and economic life feasible. It is possible not only to "break one's neck" today but to live with it moderately well.

Dr. Don H. O'Donoghue, Chairman, Department of Orthopedic and Fracture Surgery, gave permission to publish the case reports summarized in this study.

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PRACTICAL MANAGEMENT OF ERYTHROBLASTOSIS FETALIS IN A COMMUNITY HOSPITAL

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Erythroblastosis occurred in 111 of 14,908 live births on which this study was based. The goal of treatment was to avoid kernicterus by keeping the serum indirect bilirubin level from rising above 20 mg. per 100 cc. The bilirubin value was found to be more reliable than the hemoglobin value as an indicator of the severity of the hemolytic process. The most important part of treatment is the exchange transfusion, and it is necessary for all concerned to cooperate with the transfusion team. In the most severe cases, with hydrops fetalis, profound anemia, and cardiac failure, the only hope lies in immediate exchange transfusion followed by a second transfusion within three or four hours. Because treatment must be prompt, the authors believe that it should be given in the local hospital, provided laboratory facilities are adequate. In this series there were six deaths, of which five were in infants wth Rh and one in an infant with ABO incompatibility.

Since the introduction, in 1946, of exchange transfusion therapy for infants with erythroblastosis fetalis (hemolytic disease of the newborn infant), with the resultant improvement in methods of diagnosis and prognosis of this disease, a wealth of knowledge and literature has been accumulated. The early literature consisted of descriptions of the techniques of, indications for, and results of exchange transfusion. As the procedure became more standardized and its use more widespread among pediatric centers, it became increasingly evident that a number of factors are involved in the interpretation of the severity of this disease and the resultant proper management of these infants.

As early as 1949, Mollison and Cutbush [1] pointed out that babies with erythroblastosis have subnormal cord hemoglobin levels; that the majority of affected babies have cord bilirubin levels above 3 mg.%, as compared to those of unaffected babies, which range from 0.8 to 2.6 mg.%; and that the degree of anemia and hyperbilirubinemia can be related to the ultimate prognosis of the baby. Two years later, following the observation of Allen, Diamond, and Vaughan [2] that there is a relationship between severity of clinical jaundice, serum bilirubin levels, and kernicterus and that multiple exchange transfusions might be of benefit in controlling jaundice, Mollison and Cutbush [3] suggested that replacement transfusions should be "given to every infant whose bilirubin would, without treatment, exceed a safe level, perhaps 18 mg. per 100 cc."

In 1952, Hsia and co-workers [4] pointed out that there is a lag between the rise of serum bilirubin level and the development of clinical jaundice, thus clarifying the value of bilirubin levels in the earlier diagnosis of erythroblastosis, and, even more significantly, showed that there is a definite correlation between the serum bilirubin level and the occurrence of kernicterus. A serum indirect bilirubin level of 20 mg.% was thus established and almost universally accepted as the "critical maximum level" to avoid kernicterus. It was demonstrated that the bilirubin level can be markedly lowered by the removal of 85% of the affected baby's circulating blood and replacement of the infant's blood with 2 volumes (70 to 80 cc. per pound) of donor blood.

From Providence Lying-In Hospital.
Read before the Section on Pediatrics at the 107th Annual Meeting of the American Medical Association, San Francisco, June 26, 1958.

With these criteria established and kernicterus, theoretically at least, preventable, efforts were directed toward earlier diagnosis and treatment to avoid hyperbilirubinemia of this degree. Even as early as 1950, Vaughan and co-workers [5] discussed the role of earlier referral and admission of erythroblastotic babies to the hospital in improving the over-all prognosis of this disease, and this earlier admission was felt to be due largely to greater awareness on the part of local obstetricians and pediatricians of the sensitization of mothers. Feldman and associates,[6] in 1954, explained their low mortality as due to their good fortune in being able to treat the infants within the first 8 to 24 hours after birth. As late as May, 1957, Wheeler and Ambuel [7] published their "set of instructions" sent to obstetricians for the management of these babies prior to their transfer to a "treatment center."

It has been mentioned repeatedly that all babies with hemolytic disease of the newborn except those with very mild disease and those who are moribund should receive replacement therapy. Until recently there has been very little evidence in the literature that babies with hydrops fetalis, pro-

found anemia, and cardiac failure are considered salvable. It would seem that the utmost efforts now should be directed toward improvement in the care and treatment of the severely sensitized baby.

Now that the method of treatment has been well standardized and that determination of the indirect bilirubin level has been established as the criterion for the prevention of kernicterus, it is our opinion that babies with erythroblastosis fetalis can and should be managed in the local hospitals where they are born, provided adequate laboratory facilities are available. The only hope in the difficult problem of treatment of a baby with hydrops, at this time, seems to lie in immediate exchange transfusion, followed by a second transfusion within three to four hours, without consuming time in his transfer to other hospitals. It is the purpose of this paper to summarize the experience with erythroblastosis in a community hospital.

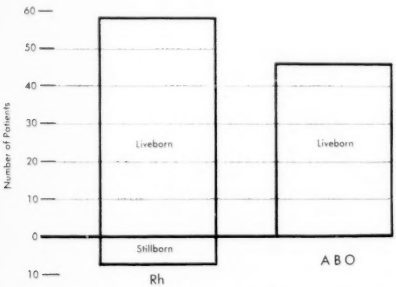

Fig. 1.—Comparison of number of patients with Rh and ABO incompatibility among 111 cases of erythroblastosis.

Material

All of the infants were cared for at the Providence (R. I.) Lying-In Hospital during the period from October, 1954, through September, 1956. The group included both clinic and private patients. During this two-year period of study there were 14,908 live births. There were 111 babies with erythroblastosis, 7 of whom were stillborn. There was, therefore, an incidence of 7.0 living erythroblastotic babies per 1,000 live births. Of these 104 living patients, 58 (55.8%) had erythroblastosis due to Rh incompatibility and 46 (44.2%) had erythroblastosis due to ABO incompatibility (fig. 1). The handling with regard to exchange transfusions and prevention of kernicterus was essentially the same for babies with disease due to ABO incompatibility as for those with disease due to Rh incompatibility. The proportion of ABO to Rh incompatibility has steadily risen at this hospital over the past few years, to the present level of 44.2%. The latest paper of Allen and Diamond [8] reveals that two-thirds of their cases of erythroblastosis fetalis are due to ABO incompatibility.

Methods

All babies, whether clinic or private, with the suspected diagnosis of erythroblastosis, were seen, given transfusion if necessary, and given follow-up examinations by one or more of the five members of the "exchange transfusion team," a group of practicing pediatricians organized in 1952 (along with the pediatric resident or the attending pediatrician).

All mothers, except those admitted in labor as emergency patients without prenatal care, had venous blood drawn for blood group and Rh factor determination early in pregnancy. Notation of the mother's type and Rh was routinely put on all the babies' charts in the delivery room. "Routine blood work," consisting of determinations of blood group, Rh factor, hemoglobin level, and Coombs' test result, was performed, immediately on delivery, on all babies of the "emergency" group. Blood was drawn during pregnancy for anti-Rh titer, as soon as mothers were found to be Rh negative; again early in the last trimester; and usually within 10 days of the anticipated time of delivery. In most cases, blood was drawn from the fathers in order to determine their genotypes.

Whenever possible, the obstetrician alerted the pediatrician of any mother whose anti-Rh titer rose during the last trimester or who had previously delivered sensitized infants. The pediatrician in turn reported these findings to a member of the exchange transfusion team. When this mother went into active labor, the laboratory, the blood bank, the delivery room, the attending pediatrician, a member of the exchange team, and the pediatric resident were notified and all arrangements were made for immediate transfusion if indicated. This coordinated teamwork is the most important requirement for good management of these infants (fig. 2).

An attempt was made to evaluate the total situation in each case. Almost invariably, very ill babies (with clinical hydrops fetalis, marked anemia, or cardiac failure) were given transfusions before leaving the delivery unit. Although cord blood usually was studied for blood group, Rh factor, direct Coombs' test, and bilirubin levels, transfusions were started in most of the babies with hydrops before results of the laboratory tests (requiring one hour) were reported.

Babies whose condition did not warrant immediate therapy were transferred to the nursery. Their cords were kept moist with isotonic sodium chloride solution; they were given nothing by mouth; and their bilirubin and hemoglobin levels were determined at 6-hour to 12-hour intervals. Decision as to management of these babies was based largely on bilirubin levels. All babies whose indirect bilirubin level rose to 20 mg.% were given transfusions, but, since early replacement therapy to remove sensitized red blood cells is felt to be more efficient than removal of serum bilirubin,"

every attempt was made to administer transfusions long before the level of 20 mg.% was reached. Babies whose indirect bilirubin level reached 7 mg.% by the age of 12 hours were usually given transfusions. Greatest emphasis, in attempting to judge the future course of these infants, was placed on the rate of rise of indirect bilirubin level. A rise greater than 0.5 mg.% per hour at any six-hour interval during the first 48 hours constituted an indication for transfusion. These figures apply of course to full-term infants. Because premature infants will develop the ability to excrete bilirubin later than will full-term babies, these infants were given transfusions when lower bilirubin levels were present.

In addition to the above methods of case finding on the basis of prenatal anti-Rh titers, all babies of Rh-negative mothers, on admission to the nursery, had the previously defined routine blood work performed immediately. This served to detect the occasional erythroblastotic baby whose mother developed no anti-Rh titer or who delivered before the last blood for titer was drawn. It is also, of course, valuable to know the Rh factor of the unaffected infant in terms of the possibility of sensitization in future pregnancies.

All babies with clinical jaundice in the first 36 hours of life or with excessive jaundice at any time during the neonatal hospitalization had routine blood work and determination of bilirubin levels done. The early detection of hemolytic anemia due to ABO incompatibility was frequently due to the alertness of the nursery nurse or the attending pediatrician to presence of jaundice. The indication for exchange transfusion in babies with ABO incompatibility was based on the same desirability of keeping the serum indirect bilirubin level below 20 mg.%. In these babies, too, the increment of more than 0.5 mg.% per hour was found to be a useful index.

Exchange transfusions were done through the umbilical vein. It has been our impression that there is no advantage in leaving the cord long. We have recently used polyvinyl premature feeding tubes. Because of the length of these tubes, it was found useful to clamp them and to insert a 16-gauge needle through the side of the tube, just below this clamp, in order to shorten the "dead space." Type O, Rh-negative blood neutralized with 10 cc. of blood group specific substances A and B (Witebsky substance) was used in all cases. Every attempt was made to use blood which had been stored for less than three days, in order to lessen hyperkalemia and the possibility of hypocalcemia.[10] The blood bank was most efficient in keeping fresh blood available and labeled "hold for exchange transfusion." Whenever time permitted, the blood was warmed in order to avoid chilling the baby, which, in our early experience, was found to be a major source of difficulty, and also to reduce the tendency toward hyperkalemia.[11]

Venous pressure readings were obtained at the outset of the procedure and at frequent intervals during the course of the transfusion. In babies in good condition, whose exchange transfusion was being done largely for the purpose of removal of sensitized red blood cells and of bilirubin, it was our policy to create a deficit only if there was evidence of significant increase in the venous pressure (up to 90 to 100 mm. H_2O), and, wherever possible, this deficit was corrected toward the end of the procedure. The transfusion was carried out in 20-cc. aliquots, except in babies with evidence of cardiac failure, to a total of 60 to 80 cc. per pound. One cubic centimeter of a 10% solution of calcium gluconate was given intravenously after every 100 cc. of exchanged blood. All babies were given oxygen by mask during the transfusion, were kept warm on a well-covered heating pad

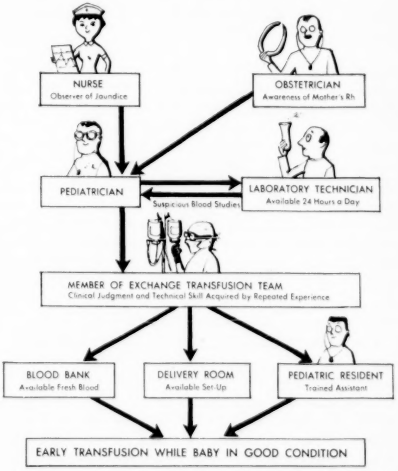

Fig. 2.—Teamwork in management of infants with erythroblastosis.

on "low" heat, and were suctioned as necessary. The transfusion took place over a period of approximately one hour.

In babies with severe erythroblastosis, if in cardiac failure, it was occasionally necessary to create a deficit of 40 to 50 cc. before undertaking the transfusion. Digitalization was started whenever there was evidence of failure. Clinically very ill babies were started on therapy with cortisone (in doses of 10 to 20 mg. a day) and antibiotics, both given intramuscularly, immediately after birth. These babies were sometimes given transfusions with 10-cc. aliquots in order to lessen the rapid changes in circulatory load.

After the transfusion, all babies were sent to the premature nursery and given heat and oxygen therapy, calcium gluconate (but nothing else) by

mouth, and prophylactic antibiotics, avoiding sulfisoxazole (Gantrisin) because of its tendency to increase hyperbilirubinemia.[12] If cortisone or digitoxin therapy had been started, it was continued in appropriate doses. Contrary to the opinions

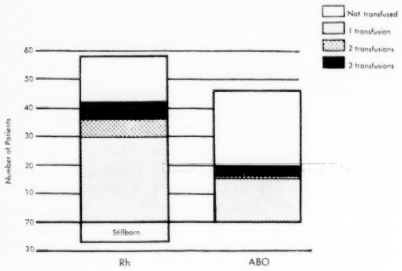

Fig. 3.—Comparison of incidence of exchange transfusions in Rh and ABO incompatibility.

expressed in the literature, it was our feeling that maintaining the catheter in situ by means of a purse-string suture was advantageous, and, with our technique, this procedure did not result in infection. Despite heparinization of the catheter, it frequently was found to contain clots. If it was necessary to replace it, at the time of the second transfusion, insertion of a new catheter was extremely simple in a nicely maintained patent vein, as contrasted to previous mechanical difficulties with dried up vein ends in a drying cord. As soon as the serum bilirubin level began to stabilize or fall, the catheter was removed. Rarely did one remain in for more than 36 hours.

The hemoglobin and bilirubin levels were determined within 6 to 12 hours after the first replacement transfusion and thereafter at 6-hour to 12-hour intervals until the bilirubin level was stabilized below 20 mg.% or until it failed to rise at a significant rate. Babies with rising direct bilirubin levels were given cortisone in an attempt to evaluate its function in the inspissated bile syndrome.

Small transfusions during the usual 10-day hospital stay, or the ensuing six-week convalescent period at home, were given only if the infant had sufficient anemia to produce symptoms, i. e., lethargy, poor appetite, and failure to gain weight, or in the face of late bone marrow recovery as evidenced by failure to maintain the hemoglobin level. Transfusions were rarely given for hemoglobin levels above 7 Gm.%.

Results

Necessity for Exchange Transfusion Therapy.—Sixty-one of the 104 live-born babies on whom the diagnosis of erythroblastosis fetalis was made required exchange transfusion. Seventy-three per cent of the babies with Rh incompatibility were given transfusions. Forty-two of these 58 infants required 61 exchange transfusions. Of these babies, 29 received only one transfusion, 7 received only two transfusions, and 6 received three transfusions. Forty-one per cent of the babies with ABO incompatibility were given transfusions. Nineteen of the 46 infants required 26 transfusions. Of these babies, 15 received only one transfusion, 1 received only two transfusions, and 3 received three transfusions.

It can be readily seen from figure 3 that, despite the fact that the incidence of ABO incompatibility is increasing because of increasing awareness of its possibility, Rh incompatibility remains, in general, a more serious disease, requiring more vigorous treatment. Nevertheless, ABO incompatibility may produce bilirubinemia with dangerous levels, and such infants should be watched carefully.

Age at Time of Earliest Treatment.—The earlier diagnosis and necessity for earlier treatment of the babies with Rh incompatibility, as compared to those with ABO incompatibility, is illustrated by figure 4. The initial exchange transfusion in 15 (36%) of the babies with Rh incompatibility was done within four hours of birth, and in 39 (93%) of these patients the initial transfusion was done within 24 hours of birth. Of the three babies receiving their earliest therapy later than 24 hours of age, one had an indirect bilirubin level of 16 mg.% at 48 hours but showed a sudden rise to 23 mg.% at 80 hours, accompanied by a drop in hemoglobin level, and so was given transfusion at 80 hours of age; one was given a transfusion at 72 hours of age, after a slow rise in indirect bilirubin level to 19.7 mg.%; and one was given a transfusion at the age of 36 hours. This baby's bilirubin level was 10.5 mg.% at 12 hours, 16 mg.% at 24 hours, and 20 mg.% at the age of 36 hours.

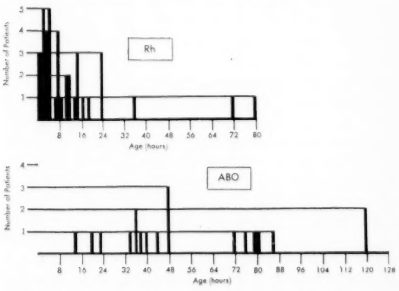

Fig. 4.—Age at time of first exchange transfusion.

On the other hand, the initial transfusion in 15 (79%) of the babies with ABO incompatibility was not performed until the age of 36 hours or more. Of the four babies with ABO incompatibility who received transfusions at less than 36 hours of age, only one had an indirect bilirubin level greater than 15 mg.% at the time of initial transfusion.

This baby required three transfusions. Of the other three babies, none showed a rise as great as 0.5 mg.% per hour in the 12 hours prior to transfusion. In the light of our further experience, it is our impression that these three infants may have not needed replacement transfusion therapy, and we would now undoubtedly "watch" them longer.

Maternal Anti-Rh Titers.—The maternal titers were followed in 11 of the 15 surviving babies with Rh incompatibility who did not require exchange transfusion therapy. One mother had an anti-Rh titer of 1:128 during her last trimester, one had an anti-Rh titer of 1:512; and the remaining nine mothers had titers of 1:16 or less during the last trimester.

Maternal anti-Rh titers were determined in 33 of the 42 cases of Rh incompatibility in which the babies required exchange transfusions. Eight mothers had anti-Rh titers during the last trimester of 1:16 or less, and 25 mothers had titers greater than 1:16 during the last trimester.

Among the seven patients with stillborn babies, one mother's anti-Rh titer was not determined. The titer during the last trimester in all six of the other mothers was 1:4,096 or greater. It is evident from figure 5 that, although there is not always a good correlation between anti-Rh titer and severity of erythroblastosis, a titer of 1:16 or more should at least serve to alert the obstetrician and pediatrician to the possible necessity for transfusion.

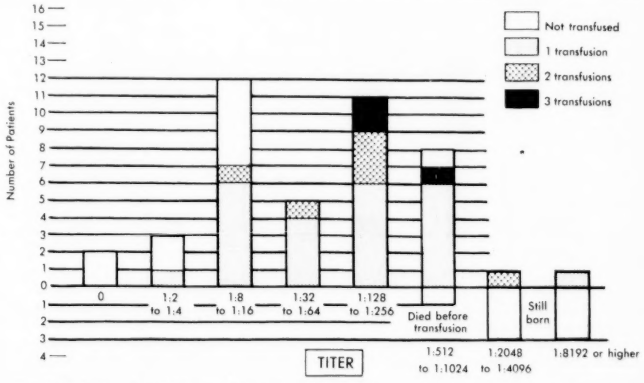

Fig. 5—Relation of anti-Rh titer during last trimester to severity of erythroblastosis in 50 cases.

Bilirubin Levels.—There was a marked discrepancy in the cord blood indirect bilirubin levels, in the patients given transfusions, between the first and second years of the study. Between October, 1954, and September, 1955, cord indirect bilirubin levels were done on 15 of the 17 babies who received transfusions. Of these 15, only 3 babies had cord indirect bilirubin levels greater than 4 mg.%. In the year ending Sept. 30, 1956, cord bilirubin levels were done on 14 of the 25 babies given transfusions. Of these 14, 10 had cord indirect bilirubin levels of more than 4 mg.%. Those babies on whom cord bilirubin levels were not determined either were clinically very sick, and were given transfusions without awaiting results of bilirubin level determination, or had erythroblastosis not anticipated because of very low maternal anti-Rh titers. Therefore, bilirubin levels, in the latter group, were not determined until the other cord blood examination revealed evidence of erythroblastosis. It is now our policy to record cord bilirubin levels on very sick babies in an effort to aid in determining the prognostic significance of cord bilirubin levels in future handling of babies with erythroblastosis. In the two-year period, cord blood bilirubin level determinations were made on 6 of the 16 babies with erythroblastosis in whom transfusion was not done. All except one of these indirect bilirubin levels were below 4.0 mg.%. These results are summarized in figure 6.

It is our impression that the lower cord bilirubin levels of babies given transfusion during the first year of the study reveal inexperienced interpretation and lack of security in "watching" these babies and that some of the exchange transfusions done in 1955 could have been avoided. Nevertheless, as has been often stated in the literature, we would far rather have done one unnecessary transfusion than have run the risk of one irrevocable instance of kernicterus.

Of the 15 babies with Rh incompatibility who had initial transfusions later than 12 hours of age, only 4 had an indirect bilirubin level of less than 7 mg.% at the age of 12 hours. Of these four, one was the previously described infant whose bilirubin level rose to 23 mg.% at the age of 72 hours. Two others had a history of severe erythroblastosis in previous siblings. One was the mother's fourth baby. Three previous babies, born elsewhere, were normal. (The mother had had transfusions 20 years earlier.) This baby's indirect bilirubin level rose from 2.2 mg.% in the cord to 6.7 mg.% at the age of 13 hours. This baby, in the light of our later experiences, may have been unnecessarily given transfusion.

From these bilirubin determinations, it is our impression that babies with a cord blood indirect bilirubin level of more than 4 mg.% or a level of more than 7 mg.% at 12 hours will ultimately need

exchange transfusion therapy. There were no cases of kernicterus among this series of patients.

Hemoglobin Levels.—There were nine infants who had a level of less than 10 Gm.% of hemoglobin prior to the first replacement transfusion. In this group, four infants died and three of the surviving infants required multiple exchange transfusions. On the other hand, eight other infants had multiple exchange transfusions. In this group, five infants had initial hemoglobin levels between 13.3 and 23 Gm.%. The other three were sufficiently ill, prior to the first transfusion, to warrant doing the procedure on the basis of the clinical picture and the laboratory evidence of the presence of Rh incompatibility and sensitization.

It is our interpretation that an initial hemoglobin level of less than 10 Gm.% is usually an indication of severe erythroblastosis. However, the converse is not always true. Babies with erythroblastosis of sufficient severity to require multiple exchange transfusions to prevent kernicterus do not necessarily have marked anemia early, as their hematopoesis may be sufficient to maintain their hemoglobin levels. Although we did not routinely obtain reticulocyte counts, it has been brought out by Allen and Diamond [13] that they are of prognostic value, particularly in those babies with high hemoglobin levels. Exchange transfusions, however, were done largely on the basis of bilirubin levels, and reticulocyte counts probably need not be included among the "minimal requirements" for successful practical management of these babies.

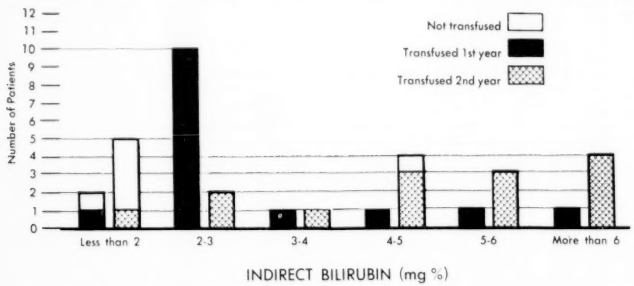

Fig. 6.—Relation of cord indirect bilirubin level to necessity for exchange transfusion in 35 patients with Rh incompatibility.

There was no significant correlation between bilirubin and hemoglobin levels after exchange transfusions. These results bear out the fact that much of the hyperbilirubinemia after exchange transfusion therapy is due to mobilization of tissue bilirubin rather than further hemolysis. Since the fundamental purpose of multiple transfusions is to prevent kernicterus, determinations of the hemoglobin levels are of little value late in the course of treated erythroblastosis in assessing the need for further therapy.

Use of Cortisone

During 1956, nine babies were given cortisone intramuscularly in doses varying from 5 to 20 mg. a day for periods varying from 1 to 16 days. No baby was given cortisone as a substitute for transfusion therapy. It was used always in addition to all of the other accepted therapeutic measures.

One infant with mild erythroblastosis, whose indirect bilirubin level had gradually risen to 16.7 mg.% on the third day of life, was then started on doses of 20 mg. of cortisone per day. Twenty-four hours later (on the fourth day) the indirect bilirubin level was 22.4 mg.%, 24 hours after that (on the fifth day) it was 19.6 mg.%, and it gradually fell thereafter. This chain of events might well have taken exactly the same course without cortisone therapy, so this drug was probably of no benefit in the management of this baby.

Two babies who were given cortisone because of poor clinical condition received only one dose prior to death. These had an insufficient amount to permit evaluation of cortisone effect in combating stress.

Two babies with severe clinical hydrops fetalis were started on cortisone as adjuvant therapy at birth. One of these died with a ruptured spleen at 34 hours of age, after three replacement transfusions; the other died with sepsis and pneumonia at the age of 60 hours, after two transfusions. It was felt that these babies may have survived longer than was to be expected without cortisone and that steroid therapy may be of increasing benefit as we become better able to manage infants with severe erythroblastosis.

Four infants were given cortisone for its possible effect in the inspissated bile syndrome. Two of these babies developed this complication while receiving cortisone therapy, and, in both, the direct bilirubin level began to fall on the fifth day of life.

Two other babies were started on cortisone therapy after the inspissated bile syndrome had already developed and was rapidly increasing in its severity. One of these babies was 4 days old and the other, 15 days. The direct bilirubin level in both of these babies began to drop within 24 hours of the institution of steroid therapy. The baby who had been started on cortisone therapy at 15 days of age had three exchange transfusions in the first two and one-half days of life. The direct bilirubin level gradually rose to 7.2 mg.%, the liver began to increase in size, and the baby

began to vomit. Twenty-four hours after starting cortisone therapy, in doses of 5 mg. every 12 hours, the stools, which had been intermittently grey, became bright yellow, the baby stopped vomiting, and the direct bilirubin level began to fall.

It was our impression that the early fall in direct serum bilirubin level was related to cortisone therapy. One of the original diagnostic criteria set forth by Hsia and co-workers [14] for the "inspissated bile syndrome" due to erythroblastosis fetalis was persistent elevation of the direct bilirubin lasting more than the first three weeks of life. Cortisone is a cholagogue, and its effect may have been on that basis, although in the past other choleretic agents have not influenced the level of direct bilirubin.[15] If one subscribes to the theory that the high level of direct bilirubin in these babies is due to parenchymal liver cell changes rather than to plugging of the bile canaliculi, one might attribute the improvement noted in these infants to the anabolic effect of cortisone, with perhaps more rapid liver regeneration.

Summary of Deaths Among 104 Live-Born Infants with Erythroblastosis Fetalis

Case, No.	Gravida	Previous Infants	Blood Studies: Group: Mother: Type	Mother: Rh	Infant: Type	Infant: Rh	Titer	Result of Coombs' Test	Hemoglobin Level, Gm. %	Indirect Bilirubin Level, Mg. %	Age at 1st Transfusion, Hr.	Transfusions, No.	Age at Death, Hr.	Autopsy Findings	Remarks
1	4	3 living and well	O	+	A	+	...	—	14	23.2	80	1	120	Atelectasis, bilateral subdural hemorrhages	No prenatal care; indirect bilirubin level 17 mg. % prior to death
2	2	1 living and well	AB	—	A	+	1:1,024	+	16.7	5.6†	No transfusion		27	None	Born at 6½ mo.; wt. 3½ lb.; died of respiratory failure
3	5	3 living and well; 1 living with cerebral palsy (had erythroblastosis)	A	—	Not determined		1:256	...	6*	2.6‡	1½	3	34	Ruptured spleen, no kernicterus	Hydrops; first transfusion done without awaiting laboratory results
4	4	1st and 3rd living and well; 2nd terminated in miscarriage	B	—	A	+	1:128	+	9.9*	...	2	2	66	None	Hydrops; bilirubin level dropping during last 24 hr.; died of pneumonia and sepsis
5	4	1st and 3rd living and well; 2nd stillborn	A	+	O	+	...	+	8.4*	7.3‡	2	1	3	Hepatosplenomegaly, extramedullary hematopoesis	Hydrops; mother c negative; baby c positive; died 45 min. after transfusion started
6	3	1st living and well; 2nd stillborn, with erythroblastosis	A	—	O	—	1:64	+	5*	2.7‡	1	1	2	None	Hydrops; died 49 min. after transfusion started

* At birth.
† At 12 hours of age.
‡ Cord blood.

Deaths

There were six deaths among the 104 live born babies on whom the diagnosis of erythroblastosis was made, resulting in an over-all mortality of 5.8%, a mortality of 2.2% in the babies with ABO incompatibility, and a mortality of 8.6% in those with Rh incompatibility. These cases are summarized in the table.

It is evident that, in the infants whose deaths can be actually attributed to erythroblastosis fetalis, the disease was present in its most serious form. Initial exchange transfusion therapy was started in all of these babies at less than 2 hours of age. They were all given antibiotics, and three of the four were started on cortisone therapy prior to transfusion. It is this group of babies who have been thought to be not salvable and to be the victims of fatal disease.

It is our feeling that some of these infants should eventually be saved by prompt and adequate treatment by a well-organized and experienced group of pediatricians working in close cooperation with obstetricians, laboratory, and blood bank. Since the period of study covered by this paper, two babies with hydrops fetalis and another infant whose hemoglobin level at birth was 2 Gm.% have recovered without kernicterus or other sequelae. These babies have all had initial transfusions within one to two hours after delivery. After these initial transfusions, they were allowed a period of two to three hours for postoperative recovery and have then been given second replacement transfusions, far earlier than in our past experience. It is our present working hypothesis that babies with hydrops fetalis are not too sick to be given transfusions but that rapidly repeated replacement transfusions may be lifesaving.

Since the period of this study, early induction of labor has become an important factor in the salvage of babies with potentially severe erythroblastosis. As contrasted to the use of induction in the early studies of erythroblastosis, this method is now rarely attempted prior to the 37th or 38th week of pregnancy. This timing has been found optimum in order to achieve a "happy medium" between the disadvantages of erythroblastosis in a premature infant and the increasing severity of

the process during the last three weeks in utero. As time goes on, properly timed induction will undoubtedly be lifesaving in babies whose mothers have previously had infants with severe erythroblastosis and whose titers give evidence of another severely sensitized baby.

Comment

Until recently, the management of babies with erythroblastosis has been undertaken almost entirely by large teaching hospitals, which have served as referral centers for babies from large surrounding areas. It has thus been necessary to set forth certain instructions for the local hospitals with regard to care of the cord, obtaining of blood samples, and other procedures prior to transporting the infants to the treatment center, and the time consumed in transfer of these babies has sometimes interfered with their optimum treatment. It has been the general feeling that the severely ill babies with hydrops fetalis and cardiac failure are too sick to be treated and that death is inevitable before exchange transfusion can be started. It was the aim of this paper to record the experience of a group of practicing pediatricians in the management of erythroblastosis fetalis in a community hospital.

It is difficult to compare our mortality statistics with those of other groups, as their results frequently refer only to those babies who were given replacement transfusions, which automatically exclude the severely ill babies who were felt to be moribund and "too sick to be given transfusions." In other series, such as that of Wiener and associates,[16] the statistics have been broken down according to differences in severity of illness in the various treated groups, without presentation of an over-all mortality. Our results, with a mortality of 5.8%, compare favorably with the latter report and with a group similar to ours, reported by Feldman and co-workers[5] in 1954, in which there was a mortality of 6.6% and also with a group recently reported by Kelsall and others,[17] with a mortality of 11.9%. It should be reiterated that we have had no patients develop kernicterus with our methods of management.

The most important major requirement for effective management of these babies in a community hospital is coordinated teamwork (with 24-hour availability of all concerned) between the obstetrician, the attending pediatrician, the pediatricians on the exchange transfusion team, the diagnostic laboratory, the blood bank, and the nursery and delivery room personnel. This is one of the rare pediatric diseases in which elimination of wasted time may be lifesaving.

The minimum laboratory techniques required for proper practical management of these infants are not numerous and are usually available in most hospitals. In order to predict possible erythroblastosis fetalis during pregnancy, one must be able to determine maternal blood group, Rh factor, and anti-Rh titer.

In order to substantiate the diagnosis of suspected Rh incompatibility at birth or to diagnose Rh or ABO incompatibility in babies with jaundice during the first 24 hours or undue jaundice during the first five days, one must be able to determine the baby's blood group, Rh factor, Coombs' test result, hemoglobin level, and serum direct and indirect bilirubin levels.

The actual performance of an exchange transfusion requires a certain amount of technical skill. The experience of doing some replacement transfusions, however, is now almost inevitably included in a pediatric residency. The multiple minor technical skills which can make the procedure go smoothly and the ability to recognize and correct the technical difficulties which can slow the transfusion are easily acquired, but only with experience. It has been the feeling in this hospital that it is advisable to have all babies with erythroblastosis or suspected erythroblastosis given follow-up studies by a small group of pediatricians and also given transfusions by this group, as good clinical judgment and technical skill can best be acquired by frequent experience on the part of a few as compared to rare experience of many. The procedure can be thus performed in a shorter time, with less trauma to the infant. It must be remembered that, with increased skill in management of the mechanical procedure, the transfusion may progress very rapidly, and it becomes necessary to consciously slow down. A more efficient bilirubin exchange results if at least one hour is consumed in the procedure.

The facilities and instruments necessary for performing exchange transfusions are available in any hospital and include a few simple surgical instruments, sterile polyethylene catheters, 10% calcium gluconate solution, blood group specific substances A and B, and available donors of type O, Rh-negative blood. The adjuvant requirements for effective transfusion therapy and for follow-up care include oxygen, facilities for warming the infant, antibiotics, digitalis, and cortisone. It should be reiterated that, as a practical aid, the advantages of leaving the catheter in situ until the baby's condition is stabilized may outweigh its dangers. Another practical point which has lessened our technical difficulty is the omission of feeding of these infants in order to prevent aspiration. The one most important follow-up laboratory test, for babies with erythroblastosis given transfusions and those not requiring transfusion, is determination of the serum bilirubin level.

The decision as to the necessity for and the optimum time of replacement transfusion therapy remains the largest and most important problem in the management of these babies. Now that the problem has resolved itself into correction of anemia, correction of cardiac failure, and prevention of kernicterus by prevention of hyperbilirubinemia with levels greater than 20 mg.%, these decisions can be made by any experienced group with avail-

able adequate laboratory facilities. As has been repeatedly stated in the literature, no one criterion can be used in making these decisions and in each infant all factors must be considered. In general, we have adopted the following indications for initial exchange transfusion of a full-term baby: (1) unequivocal—clinical hydrops fetalis, cardiac failure and profound anemia, and indirect bilirubin level greater than 20 mg.%; (2) reliable—cord blood indirect bilirubin level greater than 4 mg.%, indirect bilirubin level more than 7 mg.% at the age of 12 hours, rise in serum indirect bilirubin level of more than 0.5 mg.% per hour, and birth hemoglobin level of less than 10 Gm.%; and (3) helpful but unreliable, and not to be used without reliable indications—rising maternal anti-Rh titer during last trimester, maternal anti-Rh titer at term of more than 1:16, and history of previous infants with erythroblastosis. The following indications have been adopted for multiple exchange transfusions: (1) indirect bilirubin level greater than 20 mg.%, (2) rise in indirect bilirubin level of more than 0.5 mg.% per hour, and (3) poor clinical condition of the infant.

The use of these criteria will result in more prompt initial transfusion therapy in the future, and there will probably be fewer multiple transfusions. Also, the use of these criteria will give more security in watching babies with erythroblastosis whose bilirubin levels are below those set forth at the various ages. The ultimate result in the next few years will be a decrease in the number of babies with erythroblastosis given transfusions.

The use of cortisone as an adjuvant treatment (along with the continued effort to give transfusions early and as frequently as necessary) in the management of babies with very severe erythroblastosis should be further investigated. Previous reports of the use of steroid hormones in these babies refer only to their lack of value in decreasing hemolysis. We feel that cortisone may prove invaluable in combating stress before the anemia is corrected. No reports of cortisone in treatment of the inspissated bile syndrome are available, but it is our experience, from this study as well as from more recent use in even larger doses (20 to 30 mg. per day), that it exerts a definite beneficial effect. It should be pointed out that it is imperative that prophylactic antibiotics be given along with steroid therapy.

Summary and Conclusions

A study has been made of 111 infants, with erythroblastosis fetalis, born during a two-year period in a community hospital. It was found that erythroblastosis due to Rh incompatibility is diagnosed and treated earlier than that due to ABO incompatibility. Because early exchange transfusion to remove sensitized cells in babies with disease due to Rh incompatibility is more efficient than late exchange transfusion to remove bilirubin, criteria for early diagnosis and prediction of dangerous hyperbilirubinemia have been developed. These criteria are important in decreasing the number of unnecessary exchange transfusions. Babies previously considered "too sick to be given transfusions" should be treated promptly. Cortisone is of probable benefit in the management of sick babies and in treatment of the inspissated bile syndrome.

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CLINICAL NOTES

CLONIC CONVULSIONS AFTER THE ORAL USE OF PERPHENAZINE (TRILAFON)

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and
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There is a perpetual endeavor on the part of the clinician and the pharmaceutical houses to find a drug or combination of drugs that will effectively combat the annoying symptoms of nausea and vomiting. The phenothiazine group of drugs has been received with a good deal of enthusiasm for the management of hyperemesis resulting from a wide variety of causes, and no one specialty has been alone in reporting findings after the clinical investigation of these drugs.

Perphenazine is one of the newer drugs falling into the phenothiazine group and has been demonstrated to be 16 to 48 times as effective as chorpromazine (Thorazine) against drug-induced vomiting [1]; its greater effectiveness increases in proportion with the dose of the emetic stimulus. It is, furthermore, a versatile antiemetic and has been reported to be effective against a variety of drugs [1] in the prevention and management of nausea and vomiting after surgical anesthesia [2] and as an antiemetic agent in terminal cancer where other of the phenothiazine drugs have failed to provide relief.[3]

For the purpose of keeping clinicians informed as to the possible side-effects which patients may experience in association with the use of perphenazine, we present a case of prolonged convulsions after its use in the treatment of the nausea and vomiting of pregnancy.

Report of a Case

A 21-year-old woman, six to eight weeks pregnant, was admitted to the hospital with the chief complaint of generalized clonic convulsions. During the previous week she had been experiencing early morning nausea and vomiting, although these had not progressed to the degree that she was incapacitated or unable to retain food and liquids. On consulting her private physician, she was given a prescription for perphenazine (Trilafon Repitabs), 8 mg., with directions to take one tablet twice a day, in the morning and in the evening. The first dose was taken at 4:30 p. m. on Aug. 27, 1958, and by the following morning the patient was free of any symptoms of nausea. At 8:30 a. m., the second 8-mg. dose was taken, and by 3:30 p.m. she noted a sensation of lightheadedness and some subjective difficulty in "getting my breath." At 6 p.m. the third tablet was taken, after which she ate dinner. Shortly after dinner the patient went shopping, at which time her husband noted a fine tremor of her jaw. She immediately went home and took two tablets containing acetophenetidin, acetylsalicylic acid, and caffeine (Empirin compound). Tremors soon involved her neck muscles and then the muscles of her entire body. These eventually gave way to generalized clonic convulsions. At no time did the patient lose consciousness or the ability to voluntarily move her hands or feet. Her head assumed a position of hyperextension, with her eyes rolled upward. Her physician was called, and she was immediately sent to the hospital. The patient had no history of epilepsy or previous motor seizures and denied any such findings in her family history.

Physical examination revealed a well-developed, well-nourished, and hydrated female with generalized rigidity in an opisthotonoid position. There were fine tremors noted over her entire body. Her rectus muscles were board-like in consistency. She was conscious and readily responsive. Blood pressure on admission was 120/80 mm. Hg, and pulse rate was 78 per minute. Respirations were not remarkable. The only positive findings were in the neuromuscular system. The knee and ankle jerks were hyperactive; Babinski's signs were not present.

After admission, the patient was given 120 mg. of phenobarbital intravenously along with 10 mg. of morphine sulfate intramuscularly. There was then an abatement of the convulsive episode, although the tremors persisted. Phenobarbital administration was repeated intramuscularly in 32-mg. doses twice during the night, and by morning the tremors had disappeared. The same dose was again given once during the day, when fine tremors again were noticed to involve both legs.

The urinary output was measured during the first 12 hours and was found to be adequate. The patient was discharged on the morning of Aug. 30, 1958, at which time her only complaint was the recurrence of her morning sickness.

Comment

Perphenazine is closely related to chlorpromazine, both of which derive from the phenathiazine group of drugs. Barrett [4] recently reported two cases of convulsive seizures after the administration of therapeutic doses of chlorpromazine to patients who, after full recovery, showed electroencephalographic tracings consistent with convulsive disorders. He stressed the epileptogenic properties of chlorpromazine and the danger of prescribing the drug to persons known to have convulsive tendencies. Extrapyramidal and epileptiform symptoms have also been reported after the use of perphenazine in the same dosage range but for longer periods than described here.[5] The symptoms promptly disappeared within 24 hours after discontinuance of the drug therapy. In some cases, by reduction of the dose the therapeutic effect was achieved without the accompanying side-effects.

It is evident that the dose of 8 mg. of perphenazine given twice a day was sufficient to elicit the epileptiform manifestations in the patient reported here. On withdrawal of the drug these symptoms disappeared, but the original complaint of nausea reappeared and remained despite other drug therapy. This case demonstrates the importance of instructing and cautioning office patients or outpa-

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tients as to prodromal or warning signs of abnormal extrapyramidal and epileptiform activities. Prompt reduction in the dosage, along with barbiturate supplementation, might avert the grosser disorders while allowing the patient the benefits of antiemetic medication.

Summary

A woman with emesis gravidarum, in her eighth week of pregnancy, was treated with three divided doses of perphenazine, 8 mg. each. After the last dose she developed a sustained convulsive seizure, which was successfully treated by the withdrawal of the drug and the administration of a long-acting barbiturate and morphine sulfate. Drugs of the phenothiazine group have been reported to have an epileptogenic effect on persons with convulsive tendencies as diagnosed by the electroencephalogram, even though there is no history of epilepsy or motor seizures. Recovery may be quickly accomplished by withdrawal or reduction in dosage of the drug along with supplemental barbiturate therapy.

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DOUBLE LUMEN CATHETER FOR USE WITH ARTIFICIAL KIDNEY

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and
Ernst Peschel, M.D., Durham, N. C.

Hemodialysis by means of an artificial kidney has become a well-established adjunct in maintaining life and reducing morbidity during the oliguric phase of reversible renal failure.[1] Some kidney units such as that developed by Skeggs and co-workers [2] and Kolff and Watschinger [3] utilize a pump to propel the patient's blood through the dialyzing tubing. This modification permits venous blood to be utilized for outflow to the artificial kidney. A pump or negative pressure surrounding the dialyzing membrane [4] incorporates ultrafiltration into the procedure of hemodialysis, making possible the reduction of otherwise intractable edema.[5]

Hemodialysis is time consuming. This factor limits to some extent the availability of the procedure. The period of actual dialyzation with presently available methods cannot be appreciably reduced. It is doubtful whether more rapid rates of clearance are physiologically desirable. However, any time that may be saved in preparing the instrument or the patient for the procedure would be a distinct advantage.

Most clinics utilize two peripheral vessels for hemodialysis; one for outflow to the artificial kidney and one for return from the unit.[6] Two cut-downs are obviously time consuming and predispose the patient to infection at two sites. The use of a double lumen catheter has been suggested by Rosenak [7] but such a technique has not been generally adopted.

The present report describes a double lumen catheter that may be introduced into the saphenous vein at the fossa ovalis and passed into the inferior vena cava. This catheter, made with nontoxic vinyl plastic, may be autoclaved. The over-all length is 59 cm. The distal end is a single lumen and has an outside diameter of 3.99 mm.; a second lumen opens 19 cm. from the distal end. Small openings are placed along the side before the major orifice of this lumen to prevent the wall of the vein from being aspirated over the opening. The double lumen section is ovoid and measures 6.65 mm. on the major axis and 4.98 mm. on the minor axis. The inside diameter of both lumina is 2.31 mm. The catheter is made to fit the connectors of the Kolff disposable twin coil unit.

Introduction of this catheter has presented no technical problems in adults. Similar large catheters are used in cardiovascular surgery. The technique for the cut-down is therefore well known to surgeons and will not be described.

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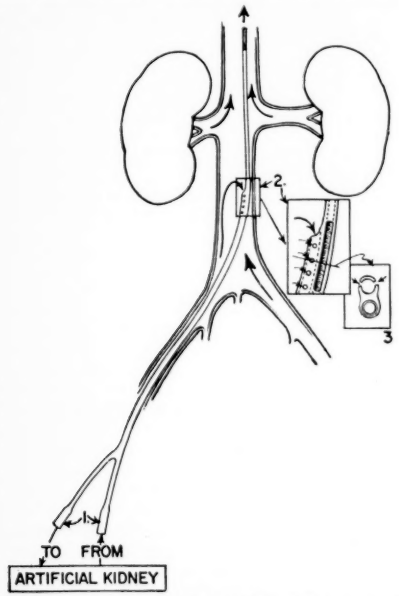
The blood returning from the artificial kidney may possibly mix with blood going to the unit and thereby modify the concentration of solutes in the latter blood. Such contamination with dialyzed blood would reduce the gradient of solutes across the dialyzing membrane, decreasing the clearance rates and efficiency of the procedure. Such mixing of blood could possibly be minimized if a considerable inflow of blood entered the vena cava between



Double lumen catheter introduced into saphenous vein at fossa ovalis and passed into inferior vena cava. (*1*, connectors for catheter; *2*, outflow from patient; *3*, cross-section view showing side openings).

the orifices of the two lumina. An attempt is therefore made by external measurement to position the catheter so that the inflow to the patient is cephalic to the renal veins (level of umbilicus) and the outflow to the artificial kidney is caudal to those veins (see figure).

In three patients dye was injected into the tubing returning blood to the patient while blood to be analyzed for dye was simultaneously drawn from tubing carrying blood to the artificial kidney. No dye was recovered in two studies while a trace of dye was recovered in the third. The possibility of mixing was further evaluated on four occasions by comparing the nonprotein nitrogen concentration of the blood flowing to and from the artificial kidney with the nonprotein nitrogen concentration of peripheral arterial blood (see table). If the concentration of nonprotein nitrogen in the arterial blood and blood flowing to the artificial kidney were similar no significant mixing occurred. It can be seen that significant mixing occurred in only one patient (case 4).

Evaluation of Mixing of Inflow and Outflow of Double Lumen Catheter

Case	Date	Initial Nonprotein Nitrogen Level, Mg. %	Duration of Dialysis, Min.*	Nonprotein Nitrogen Level, Mg. %		
				Inflow to Artificial Kidney	Inflow to Patient	Peripheral Artery
1	5/ 7/58	275	78	150	72	142
2	5/13/58	203	95	183	125‡	188
3	6/14/58	200	106	118	77	120
4	6/21/58	295	87	147†	86	195

* When observations were made.
† Suggests mixing.
‡ Suggests low flow. Patient was in congestive failure and maximum ultrafiltration was desired. During four hours of dialyzation, patient lost 3.6 kg. (8 lb.).

Comment

This double lumen catheter has been used on nine occasions in seven patients. The results of these procedures compared favorably with procedures in which separate catheters were used. Flow in each patient was entirely satisfactory. Hypotension appears to be less of a problem when blood is removed from the venous rather than the arterial system. Bleeding from the venotomy at the termination of the procedure could usually be controlled by pressure. Ligation of the vein was necessary only on one occasion. No evidence of thrombosis was apparent.

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The catheter used in this study was made by the U. S. Catheter and Instrument Corp., Glen Falls, N. Y. The Kolff unit was made by the Travenol Laboratories, Inc., Morton Grove, Ill.

This study was supported in part by grants from the American and North Carolina Heart Association and the Carolina Chain-Saw and Equipment Co., Shelby, N. C.

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MEDICINE AT WORK

- Animals in Research
- Bettering School Health
- Medicolegal Conferences
- Blood Services Listing
- Health of Workers
- SPECIAL REPORT—Snow

Case of the Elusive EKG

Keeping TV's forays into medicine at least plausible, if not completely accurate, is no mean job—as the A. M. A.'s Physician Advisory Committee on Television, Radio and Motion Pictures has found (see Medicine at Work, THE JOURNAL, May 4, 1957).

Its policy of "help, not yelp" has had effect. But the policy backfired recently in an unusual way because of a television drama based on a mistake—that of confusing a healthy man's electrocardiogram with that of a fellow with a serious heart ailment. The story's patient—upon being told the "good news"—proceeds to live it up to the point of expiration. Meantime, having discovered the error, his physician futilely searches for the hero.

The Committee detected that improbable incident in script form and suggested the network discard the basic idea as being highly unlikely. The request was observed—with thanks. No sooner had the Committee breathed a sigh of relief than it found another network had produced a film based on the same script. Efforts to have it edited in the name of credibility were fruitless, since the completed film represented a heavy investment which the network felt it could not write off. So, some 40 million viewers watched the hero die because of an incredible clerical mixup.

The experience was related by Dr. Eugene F. Hoffman of Los Angeles, chairman of the A. M. A. Committee, in a talk before the Multnomah County Medical Society in Portland, Ore.

Barbecues, Bake Sales, Essays

Pennies and Dollars Bring a Medical Center to Wilcox County

For the first time in its history, rural Wilcox County in Georgia now has a medical center. It climaxes a long struggle to provide better health services and marks the kind of challenge which scores of other communities have met and conquered (see Medicine at Work, THE JOURNAL, Sept. 29, 1956).

Rochelle, largest of five towns in the county and one of the most centrally located, had no physician. Anxious to correct this situation, its citizens made sporadic but unavailing attempts at some solution. In 1950, hopes for a 25-bed hospital under the Hill-Burton plan were dashed when a survey proved unfavorable. But, by 1956, a Wilcox County Health Committee prevailed on the state health department to survey its needs. One survey recommendation was that a county health facility be located in Rochelle.

It turned out that state and federal funds were available to help pay the cost of the center if (1) the county would appropriate $15,000 for the facility and (2) the people themselves could raise $15,000 more and provide the land. The county government appropriated its share, but, with 8,500 population and an average family income of $935 a year, raising money in Wilcox County was no mean feat. However, its citizens set to their task with a will.

Dr. David Henry Poer of Atlanta, writing in the *Journal of the Medical Association of Georgia*, tells of their efforts:

—A service club pledged $1,000 and made good through a raffle, pest control projects, and a variety show.

—A woman's club sold shrubbery, cakes, cookies, pies, and candy.

—A DAR chapter held a barbecue and also offered money from an unused student loan fund.

—A teacher organized a medical center club, and each child donating a dollar got his name on a big poster and printed in the local paper.

—School children saved their pennies, made posters, and wrote essays to promote the campaign.

—Residents who had moved away came through with contributions

This is snow—joyful, lovely, tender, and pure. It also can be an ingredient of crisis, menacing the health of masses of people. A special report on page 843, "Snow Emergency," documents three such incidents. (National Safety Council photo)

The happiness displayed by Dr. Philip S. Woodbury and his family was shared by the rest of Georgia's Wilcox County when the physician opened a practice in quarters which the townspeople had worked so hard to provide.

based on their understanding of the need.

The $15,000 was raised. When original plans to have both the clinic and the physician's office under one roof were changed, it was decided to put the hard-raised money into the doctor's building. Two sites close to each other were donated by residents, and the Sears Roebuck Foundation offered architectural plans. When a leading group of citizens found itself $8,000 short, it borrowed the money on the strength of expected repayment from rent when a doctor could be found.

Even with the new facilities, Rochelle and Wilcox County found difficulty in attracting a physician. Several visited the town but did not stay for one reason or another. Then Dr. Philip S. Woodbury arrived fresh from a general practice residency in California. He had heard about Rochelle's need through the A. M. A. Physician's Placement Service. The A. M. A. directed him to the placement service operated by the Medical Association of Georgia, and Dr. Woodward and his family were wooed and dined by the citizenry of Wilcox County. It wasn't long before both town and physician felt they had found the perfect match.

As the only active physician in that part of the county, Dr. Woodbury sees busy days ahead. In fact, he already plans to scout up another young general practitioner to help out.

Meeting a Great Need

Directory of Blood Services Emerges from Two-Year Study

The widespread use of blood as a therapeutic agent was a phenomenon of the World War II era. Thousands of American physicians in uniform saw soldiers recover after lengthy surgical operations made possible only by blood transfusion. Returning to civilian practice at war's end, these doctors sought blood sources for their own patients.

This recent history lies behind the publication last month of the nation's first comprehensive directory of blood facilities, a document issued by the Joint Blood Council. Within its pages, in tabulated form, is detailed information designed to fill the need of physicians, hospitals, and others interested in the availability of blood and its derivatives.

Publication of the directory—based on 2,202 replies to questionnaires sent to the nation's 3,150 institutions offering blood services—is a measure of the progress achieved by the Joint Blood Council which was established in 1955. One of its first actions was a postal card survey of blood usage in the United States during 1956. With this as a base, the Council undertook a two-year study of blood bank resources across the nation. The survey was financed by a $50,000 grant from the U. S. Public Health Service.

The study was sorely needed. While progress in blood transfusion services was being made locally, there was no satisfactory national program for the exchange of blood. Worse yet, perhaps, nomenclature and standards varied. The definition of a "unit" of blood for transfusion varied with the locality, and safe collection and storage standards had not been established.

The preparation of standards for accreditation of blood banks, development of a glossary of terms, and an inventory of research projects in blood and derivatives were among the objectives of the Joint Council. Reaching these objectives demanded information, and information was the prime purpose of the now-completed survey.

The Joint Blood Council has five members—the American Medical Association, the American Association of Blood Banks, the American Hospital Association, the American National Red Cross, and the American Society of Clinical Pathologists.

Four of these members were signatories, in 1950, of the so-called Boston Agreement, a national plan for the shipment of safe, whole blood. The plan was created to meet the emergency presented by the war in Korea. The Boston Agreement remained the official policy of these organizations even after

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the war ended, but by 1955, it became apparent that differing interpretations of its language and intent made something more necessary. That "something more" became the formation of the Joint Blood Council.

Publication of the directory is only one step in a plan envisioned by the Council. Other aims are:

—To develop ways and means to make blood and its derivatives available to all persons in the United States.

—To stimulate and advise on areas of research in the collection, preservation, and use of blood and its derivatives.

—To encourage the public donation of blood for civilian and defense requirements.

—To serve upon invitation as an advisory group to federal and military agencies having to deal with blood and its derivatives.

The efforts of the Joint Council have not gone unappreciated by the nation. In 1956, President Eisenhower wrote a letter to Dr. Leonard Larson, council president, and now Chairman of the A. M. A. Board of Trustees. The President termed the council's program "a humanitarian effort in keeping with the American tradition."

Socioeconomics—County Style

What are the present and future problems facing voluntary medical and surgical insurance plans? How do "third party" medical plans work out? What are a physician's responsibilities to his community outside the field of medicine? (See Medicine at Work, THE JOURNAL, March 16, 1957.)

Those are only a few of the program topics planned for the 1959 meetings of the Montgomery County (Ohio) Medical Society under a new plan begun this year. "There are dozens of scientific meetings every month," says Dr. A. J. Carlson, president of the society, "so we've decided to use our meetings as a means of approaching other aspects of medical life, those in the socioeconomic field."

Speakers scheduled so far include Dr. Norman Welch, vice-speaker of the A. M. A. House of Delegates and president of the national Blue Shield program; Arthur J. Clephane, legal counsel for the Pennsylvania State Medical Association; and Dr. John DeTar, past president of the American Academy of General Practice.

Scientific sessions are not being forgotten in Montgomery County, however. The medical society's 10 specialty sections will still hold them, as will hospital staffs and sections.

Mental Health in Rural Setting—In Practice and in Future

Visitors to next month's National Conference on Rural Health will be offered two viewpoints in the mental health spectrum. Dr. Alonzo Peeke of Volga, S. D., will speak on "Mental Health as a Part of General Practice," and Dr. Prescott Thompson, director of outpatient service at the Menninger Clinic in Topeka, Kan., has chosen "Horizons in Mental Health" as his topic.

Representatives of national farm, educational, research, and publishing organizations from some 20 states are expected to take part in the 14th annual meeting sponsored by the A. M. A. Council on Rural Health.

"Experiment in Community Health Participation," a panel discussion, will be devoted to an explanation of how one Kansas community took a long look at its health status, narrowed its sights to its paramount problem, and proceeded to do something about it. Workshop sessions will encourage conferees to outline similar situations and tell of efforts made toward solutions.

Other topics will include "The Do It Yourself Age" by Earl Butz, dean of agriculture and director of the agricultural extension service at Purdue University; "Family Physician and the Cost of Medical Care" by Dr. Conrad Barnes of Seneca, Kan.; "The New Era of Aging" by Dr. Frederick Swartz of Lansing, Mich., Chairman of the A. M. A. Committee on Aging; and "Progress in the Control of Some Diseases of Animals Affecting Rural Health" by Martin Hynes, D.V.M., of Raleigh, N. C.

Health of Workers

Representatives of the American Medical Association are joining those of 63 other health agencies in a discussion of "The Health of People Who Work." The occasion is the eighth National Health Forum sponsored by the National Health Council in Chicago March 17 to 19.

The Forum will be concerned with the challenges of occupational health. Group discussions will be held on such topics as how to evaluate occupational health programs; the responsibilities of management, labor, and other groups in the area of occupational health; and who needs to do what about such new occupational hazards as radiation and air pollution.

The A. M. A. recently reaffiliated with the NHC, which was established in 1921. The membership also includes such major health agencies as the American Dental Association, the American Public Health Association, the National Society for the Prevention of Blindness, the American National Red Cross, and the Arthritis and Rheumatism Foundation.

Best Is None Too Good For Animals Used in Research

The conditions under which laboratory animals are bred, housed, fed, treated, and transported are of vital concern to the scientist whose experimental findings may be invalidated by undiagnosed disease. This was the motivating force behind the formation nine years ago of the Animal Care Panel.

Meeting in Chicago last December for its annual session, the panel's more than 500 registrants represented all walks of scientific life. Research scientists, veterinarians, laboratory colony superintendents, animal breeders, technicians, and manufacturers of laboratory supplies attended the three-day symposium devoted to advancements in the care of laboratory animals.

The interest of the medical profession in laboratory animal condition is exemplified by the aid and encouragement given to the Animal Care Panel by the National Society for Medical Research, which publishes the panel's proceedings. The A. M. A. is a member of NSMR, and Dr. Lester R. Dragstedt, a member of the A. M. A. Council on Medical Physics, is president. Dr. Edward L. Turner, Secretary of the A. M. A. Council on Medical Education and Hospitals, is a member of the NSMR board of directors.

The Animal Care Panel's contributions to medical and biological research were amplified at the December meeting by Dr. L. T. Coggeshall, dean of the division of biological sciences at the University of Chicago. He enumerated its accumulation of information about laboratory animal husbandry, its contributions to a development of standards, its development of teaching programs and visual aids, and its work in developing a better public climate for animal research.

Dr. John L. Schmidt told the panel that a major challenge to the cardiovascular research scientist is the finding of animal species most likely to yield new information about heart and blood diseases. The importance of using several species has been pointed up by a number of studies, Dr. Schmidt said, and special breeds of small pigs are being developed that may prove valuable. He also told the group that the baboon may ultimately prove to be the ideal animal for certain studies (see box).

The use of tranquilizers to prolong the duration of anesthesia in laboratory surgery on animals was described by William C. Dolowy, D. V. M. The duration of anesthesia when pentobarbital is administered alone in rabbits and rats is 14 and 20 minutes respectively. By administering chlorpromazine along with the barbiturate, however, Dr. Dolowy said anesthesia can be prolonged to 44 minutes in rabbits and 200 minutes in rats. Strangely enough, these laboratory animals required an effective dose of up to 50 times more chlorpromazine per pound of body weight than do humans.

The assembled panelists also heard a report on WARDS, a newly-formed volunteer group of physicians and laymen interested in promoting high standards of care for laboratory animals.

Not all of the panel's problems yield to scientific solution, however. One for which there appeared no ready answer was pointed out in a report by Alan A. Creamer, D. V. M. In a 34,000-mile trip devoted to an inspection of the methods and facilities used in the trapping and shipping of monkeys for laboratory use, Dr. Creamer said he found that, in suggesting conditions for handling of monkeys, "We are asking the trappers to feed the animals better than they themselves are fed."

Baboons and Fats

The discovery that baboons, even though vegetarians, get fatty deposits in their blood vessels, a condition which marks atherosclerosis in humans, sent a team of research scientists to Africa last month. Dr. N. T. Werthessen, his research-assistant wife, and Dr. John B. Janusch made month-long biochemical studies designed to determine the baboon's blood vessel mechanism of handling fats.

Dr. Werthesen is chairman of the department of physiology and biochemistry at Southwest Foundation for Research and Education, which maintains a branch laboratory at Kibwezi in Kenya. Dr. Janusch is a physical anthropologist at Yale.

Big Ben, a mostly German Shepherd, was named Research Dog Hero of 1958 and presented with an honorary collar last December by the National Society for Medical Research. Ben was the subject of a Tulane Medical School's experiment in brain perfusion, a method of cancer treatment. In this technique, a portion of the body is isolated from the circulatory system, supplied by a heart-lung machine, and treated with above-normal dosages of anti-cancer drugs. Shown with Ben are Dr. Robert F. Ryan, instructor in surgery at Tulane, and the retired research dog's two present owners.

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Better Health in Schools—Via Physician-Educator Rapport

They'll be editing the fifth edition of a long-lived and influential textbook when the Joint Committee on Health Problems in Education meets next month. Established in 1911 by the American Medical Association and the National Education Association, the Joint Committee has functioned continuously ever since. It is one of the oldest efforts in joint activity of either parent organization.

Most of the annual session March 9 to 11 in Chicago will be given over to a critical review of manuscripts for the upcoming edition of "Health Education," a standard reference and authoritative guide first published in 1924. Publication of the new edition is set for next year.

Editors for the latest revision will include Bernice Moss, Ed.D., professor of health education at the University of Utah. She is a former member of the Committee and was its Chairman when the fourth edition was published in 1948. Other editors are Warren Southworth, Dr.P.H., professor of health education at the University of Wisconsin, and John L. Reichert, M.D., practicing pediatrician. Dr. Reichert is a former chairman of the School Health Committee of the American Academy of Pediatrics and is now a member of the Chicago Board of Education.

Various phases of the text writing have been assigned to acknowledged authorities in the field. The contributions will appear unsigned in the final manuscript.

Although it has other concerns, publications have been a major part of the work of the Joint Committee since its birth. In addition to "Health Education," it has also edited and published such companion volumes as "School Health Services," "Healthful School Living," and "Suggested School Health Policies."

In addition to its book list, the Joint Committee offers a wide range of pamphlets on health subjects of interest to educators. These cover such diverse subjects as the role of the nurse in the school, health aspects of the school lunch program, health problems in physical education, health appraisal of school children, sleep in children, and a series of five pamphlets on sex education.

The publications—ranging in price from five cents (some are free) to five dollars—are all currently available, and new ones are periodically being developed. Others are now in the process of revision. Still others have outlived their usefulness and have been discontinued.

Additional pamphlet topics up for consideration at the March meeting will be "Health Examinations of School Personnel," "Nature of the Child in Regard to School Experience," "Pupil Transportation," and "School Health Committees."

By no means has publishing been the Joint Committee's only effort toward better health in schools. Its history is studded with statements and resolutions on problems of interest and importance to pupils and teachers. Some of the more recent include a resolution on boxing in high schools, a resolution on animal experimentation, a statement on the use of tampons, a resolution on average daily attendance, and statements on general athletics and athletics for girls.

In addition, the Committee has successfully encouraged local, regional, and statewide school health conferences that are bringing together medical society members, educators, and public health personnel for discussions of school health problems.

As the Joint Committee nears the half-century point in its history, it can view its accomplishments with some perspective: In 1911, when the Committee was formed, a school physician was about as rare as the passenger pigeon, and a highly theoretical course in physiology was considered the apex in health education. Today, health has its proper place in the curriculum, is considered a prime administrative responsibility, and is an important factor in the design and maintenance of school facilities.

Chairman of the Joint Committee on Health Problems in Education is E. H. Pawsat, M.D., of Fond du Lac, Wis. A. M. A. representatives are Drs. Herman M. Jahr of Omaha; Jay J. Johns of Taylor, Texas; John F. Abele of Portland, Ore.; and Donald Dukelow of Chicago. NEA members are Austin Snyder, M.Ed., of Sayre, Pa.; Lloyd Michael, Ed.D., of Evanston, Ill.; Robert Yoho, H.S.D., of Indianapolis; Ruth Abernathy, Ph.D., of Los Angeles; and Sarah Louise Smith, Ed.D., of Tallahassee, Fla.

Clerics in Kokomo—Psychiatry and Religion Fight for Mental Health

If clergymen are adequately trained to counsel persons who have unhealthy patterns of living, many of the problems that appear can be alleviated before long-term medical-psychiatric care becomes necessary.

This was the motif last month when 23 clergymen from the Kokomo area in Indiana spent a week on the University of Chicago campus taking stock of the results of a six-month experiment in combining psychiatry and religion. Whatever may have been their original feelings, they now consider the plan a success and will continue and embellish it.

The project, financed by Lilly Endowment, Inc., of Indianapolis, is headed by the Rev. Granger

Westberg, D.D. He holds the nation's first joint professorship in theology and medicine at the University of Chicago. The plan's next six months will be studded with monthly four-hour clinical sessions held in Kokomo and headed by Dr. Westberg. In addition, he hopes to hold dinner meetings during the period with the Howard County Medical Society, Kokomo's lawyers, its educators, labor, and management.

The principle embodied in the Kokomo project—that trained clergymen can effectively combat mental illness because they work closely with people in a family setting—is not new. Many theological schools now include courses in their curricula based on the same principle (see Medicine at Work, THE JOURNAL, April 13, 1957). But Dr. Westberg sees no point in waiting for evolution to accomplish what may be done more quickly by another method. His interest is in the estimated 300,000 clergymen now holding pastorates for whom such theological innovations came too late.

Added to this, the Kokomo project has another big advantage: it deals not with the seminarian who will have to go forth and function on his own, but with the clerics of a single community who can return to their pastorates and function as a team in the fight for mental health.

Howard County's 23 ministerial pioneers have used the team concept from the very first. They spent a week on campus last June when the project was begun. They ate, lived, and studied together—with the help of the University's medical, psychiatric, and religious experts—during the period of indoctrination and returned to Kokomo with a new outlook. "This experience," one said, "has helped me feel that we clergymen are partners rather than competitors. For the first time, I really became acquainted with the other ministers."

The 23 returned to Chicago last month at the end of the six-month trial armed with a list of mental health problems noted within their congregations. These include the stresses of divorce and broken homes, the need for premarital counseling, day by day relations between doctors and clergymen, special problems of the aged, help for the alcoholic and his family, and pastoral counseling.

Although the original Kokomo group numbered only a little more than half of the town's clergy, the remaining 17 have asked Dr. Westberg to find a way that they may take part, too. He plans meetings with the second group on their home ground.

Although Dr. Westberg feels that the Kokomo project is a demonstrated success, he plans to match the program in a second community, this time in Illinois. If the success of both seem to be of equal importance, he hopes to expand the plan on a national basis.

Asked to characterize the Kokomo project, Dr. Westberg says, "I like to call it 'What to Do Until the Psychiatrist Comes.'"

Narcotics and the Law—Only One Of a Series of Medicolegal Problems

A Los Angeles physician in 1936 accepted a group of addicts for treatment—at the request of city officials who were closing a public clinic. After examination, the physician prescribed narcotic drugs for the patients and soon found himself a defendant in court.

The physician was acquitted, but not before three colleagues testified that his treatment was medically sound and two more testified it was not.

Such legal judgments indicate the need for a better understanding of the medical and legal aspects of narcotics addiction, and it is for just such increased understanding that a medicolegal symposium will be convened March 20 and 21 in Washington, D. C. The meeting will be the first in a series of three to be sponsored by the A. M. A. Law Department. Others will be held in Cleveland on April 3 and 4 and in Salt Lake City on April 17 and 18.

The programs for each will be similar and will include discussions on such other topics as traumatic neurosis, contingent fees, professional liability, impartial medical testimony, and cross examination of the expert medical witness. The groups will also view the third film in the A. M. A.'s medicolegal series, "The Man Who Didn't Walk," a study of traumatic neurosis.

Success of the past symposiums (an average audience of 300 divided almost evenly between physicians and attorneys) probably stemmed from the growing realization of the interconnection of the medical and legal disciplines. Dr. David B. Allman, former president of the A. M. A., dramatized this when he told the 1957 Philadelphia symposium:

"For many years I have had a slight acquaintanceship with the mutual problems of medicine and the law, but it was at the initial meeting in this series that I first realized the real importance of legal medicine and the absolute necessity for a closer and continuing liaison between physicians and attorneys."

MEDICINE AT WORK in future issues

- *When Medical Educators Meet*
- *Radiation—Double-Edged Sword*
- *Homemakers for Health*
- *Suicide—A Medical Problem*
- *Women in Medicine*
- *Hypnosis—Tool or Weapon*
- *Medical Research Heroes*

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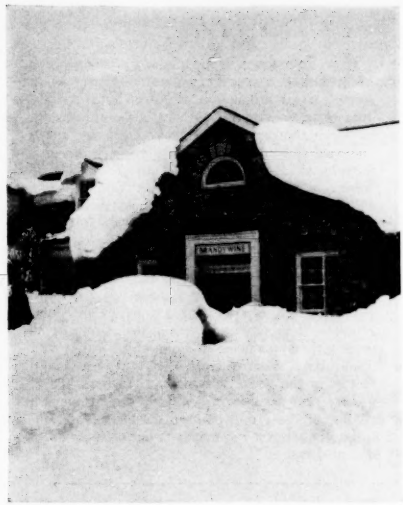


Three feet of snow buries autos at restaurant off Pennsylvania Turnpike where 800 motorists and passengers were stranded for nearly two days last March. Health problems inside were solved, with help of Air Force helicopter evacuation of serious cases, but one man died of heart attack while struggling through storm toward the shelter. (All photos from U. S. Air Force)

Snow Emergency!

Physicians as Leaders In the Midst of Storm

Milton Golin

> Probable nor'-east to sou'-west winds, varying to the southard and westard and eastard and points between; high and low barometer, sweeping round from place to place; probable areas of rain, snow, hail and drought, succeeded or preceded by earthquakes with thunder and lightning.

When Mark Twain spoke those words 82 years ago he was caricaturizing New England weather. Yet, in the very exaggeration, his burlesque might also fit the current season's rampaging weather—not only in New England but in other areas of the U. S. For, to residents of many localities, this has been the severest winter in memory: Rain and ice-choked rivers flooding entire villages in Ohio and Pennsylvania, sleet and gale-force winds ripping a $10 million property loss in upstate New York, snow and bitter cold isolating scores of communities in the Middle West. And ahead lies the spring which can melt the snow which can bring more catastrophe.

Each severe weather emergency spells a crisis or potential crisis in the lives of large masses of people. Each poses a public health problem of particularly intense personal concern—for water and warmth, for sanitation and shelter, for meals and medicines, for companionship and comfort. Probably no other public health situation surpasses a natural disaster in the degree to which private physicians, on short notice, have exerted action and leadership along with other medical personnel. Time and again, the individual practitioner in the face of community calamity has personified "medicine's finest hour." (See Medicine at Work, THE JOURNAL, Nov. 24, 1956, and Aug. 10, 1957.)

But while tornado, flood, hurricane, fire, trainwreck, and earthquake are almost invariably obvious in their sudden villainy, the peril of snow so often is not obvious, not sudden, and not immediately recognized as a villain.

It can appear joyful.

It can look tender and pure.

It can wear a lovely face.

Joyful?

Just a couple of weeks before last Christmas, Dr. James F. Grant strolls out of what seems to be a light and jolly snowfall and into the city hospital of a midstate New York community of 23,000. That evening he peers out of a hospital window. The snow has piled up to four feet! This is Oswego, scene of one of the most paralyzing snows ever to strike a U. S. community. It keeps snowing—to the five-foot mark, then to five and a half feet. It stops for a while. (At last report, Oswego's snowfall for this season was more than 150 inches, including a "mild" 10 inches one week end last month.)

As Oswego City Hospital becomes the emergency center for all medical activities, 10 of the 18 staff physicians work day and night without sleep—functioning under a prearranged civil defense plan that has patients abed in the cafeteria and state police cars and snowplows doubling as ambulances. "No use going home," says Dr. Grant, a pediatrician who serves as city health officer. "I tried, and gave up after it took 90 minutes to move less than half a mile."

Two obstetricians of Oswego, Drs. William F. Quigley and John S. Puzauskas, are wise enough to transport their patients to the hospital before the snow is too high. But one emergency maternity patient must be brought in by a police official who is forced to back up his car 10 miles along a single-lane snow-walled path. A few of the sick cannot be reached immediately because doctors are

caught in stalled autos. But, under medical direction, civil defense volunteers deliver drugs and supplies, and soon they are making door-to-door calls to ascertain medical needs in neighborhoods where power and phone lines are down.

Transportation comes to a virtual halt, and so nurses use skis and snowshoes to reach the city hospital. One registered nurse, Mrs. Areta Ware, makes her way 30 miles in the storm to report for duty. "Snowstorm casualties are surprisingly light," reports Dr. Grant. "Our medical civil defense plan deserves a lot of credit for that."

One patient at city hospital during the height of the storm is a Mr. Snow. He reacts good-naturedly when joshed about getting a bill for doubled room rates. . . .

Tender and Pure?

It is Easter vacation from classes for scores of college students less than a year ago as they ride toward home, in autos and buses, along the Pennsylvania turnpike. The snow is falling, soft and clean. Also on the turnpike near Morgantown, Pa., that March 19 are more than 100 truck drivers, four ministers, three nuns, 20 members of a "rock and roll" troupe, a dozen servicemen, 40 young children, two ambulance drivers, three nurses, three doctors.

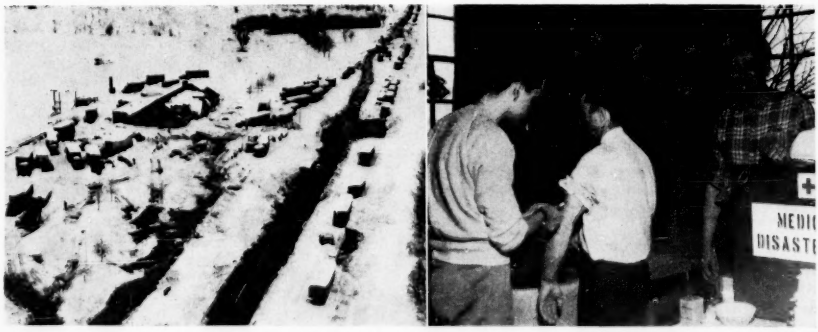
All of them and more—a total of 800 persons—suddenly find themselves stranded in the tender and pure snow. Envisioning a fight for survival, they abandon their vehicles and head for the same place—a restaurant which normally handles only 200 customers for brief periods.

In the group is a 33-year-old obstetrician from near-by Columbia, Pa., Dr. Robert M. Lombard. He is worrying about incubation of disease under such crowded conditions, planning a rescue effort for an ambulance patient, mulling over the details of establishing a first-aid station. Those thoughts are interrupted by shouting voices: "That's my hamburger." "No, it's mine." Dr. Lombard sees men, women, and teen-agers scrambling for food—people tired, hungry, and discouraged. He sees the need for a bold move to reduce this mounting tension.

So Dr. Lombard leaps onto a restaurant counter and introduces himself. Everyone turns and stops talking at once. It is so quiet you can hear the snow falling. He says: "We need some organization here if we are to wait this out in good health. Are there volunteers to help?" By actual count, more than 700 of the shelterees offer

Observers of Crises

How do masses of people behave when they are engulfed in sudden calamity? How can lessons learned from one disaster help a different set of individuals to weather another catastrophe a thousand miles away? Exploring human behavior during a community crisis is the chief mission of a little-heralded group—the Disaster Research Group (formerly the Committee on Disaster Studies) of the National Academy of Sciences—National Research Council. It collaborates with anthropologists, psychologists, sociologists, and other scientists in interviewing victims of severe snowstorms, tornadoes, explosions, and floods. So far, the Disaster Research Group has published ten reports and a number of journal articles. Members have found that some of the most serious obstacles to survival are faulty communications systems. And, they add, two leading factors in the wake of disaster have been the degree of preparedness and of organized leadership. As one of the group pointed out, "Somebody has to be in charge if the mayor is out of town on the day of disaster."



Left, helicopter view of trucks, autos and buses abandoned on Pennsylvania Turnpike during heavy snowfall last March. *Right*, administering penicillin injection at makeshift medical center set up in restaurant for one of 800 persons thrown together there for up to 36 hours. Place normally serves no more than 200 customers for brief periods.

a variety of services. Moments later, as Dr. Lombard shares supervisory roles with two Air Force majors and two sales managers, there is order—and the tension gradually eases. What is the situation?

An auxiliary power generator is providing basic needs for heat, light, and cooking. Five telephone lines remain open. The first-aid center is set up for exposure victims, two diabetic patients, a child with croup, and a woman in shock. Well-designed toilet facilities meet sanitation needs. A man dies of a heart attack while struggling in the snow toward the restaurant; his body is wrapped in blankets and kept outside until flown out by helicopter the next day. Meanwhile, the nuns comfort his widow. Doors and windows are thrown open every half hour, at the direction of Dr. Lombard, in order to ventilate the building. Sandwiches are delivered to a busload of riders who have not evacuated to the restaurant. In anticipation of possible drunken behavior, a public plea is sounded to donate liquor for medicinal purposes; five bottles are contributed to the dispensary as a result.

Finally, after 36 hours, the turnpike is cleared of snow and evacuation takes place. Dr. Lombard leaves with the others. . . .

Lovely?

It is just a few weeks ago—Jan. 14, 1959. Dr. Walter H. Roehll, a general practitioner from Middletown, Ohio, and member of the Middletown hospital disaster committee, is counting the hours in terms of years as his airliner circles Chicago to await landing in severe wintry weather. Exactly seven hours up is the plane—exactly seven years back go the recollections of Dr. Roehll.

He remembers the lovely snow peaks of the California Sierras that Jan. 14, 1952, when a streamliner train carrying himself and 225 other persons is stuck at Yuba Gap in this century's worst blizzard of the California high country. The recall of those 72 hours of danger and terror is vivid: Fresh water gone and lights going, plumbing frozen, food dwindling, morale dropping, heat vanishing, and above the train an incipient avalanche. A narcotics addict on board, suffering withdrawal symptoms, seems to be going mad. Worst of all, scores of passengers are knocked out by carbon monoxide fumes from the exhaust of an unvented generator.

Dr. Roehll, accepting leadership responsibilities, rations his meager supply of drugs to nip upper respiratory infections and to relieve the narcotics addict temporarily. (Gin from the club car is used for skin and syringe sterilization.) A half-dozen nurses among the passengers are his emergency staff. Without sleep hour after hour, fighting off unconsciousness, Dr. Roehll manages to make his rounds from car to car—reassuring frightened mothers and whimpering children.

Finally, rescue comes. Later, Dr. Roehll writes: "The fact that severe disaster did not occur is in no way due to any heroic or unusual practice but, rather, due to the fact that rescue operations were successfully carried out as quickly as possible. The physician must maintain a high sense of faith in his fellow man and require him to do only the possible and, by his actions and manners instill confidence in ultimate rescue and relief. . . . In a disaster—potential or real—the key word is conservation—conservation of water, of worry, of all the physical, mental, and spiritual stock."

For his "untiring zeal beyond the call of duty" Dr. Roehll is honored in resolutions adopted by the Ohio State Medical Association and the A. M. A. House of Delegates. . . .

Officially, Spring is one month away. But for many parts of the nation, the snow and cold of winter have more than four weeks to run. Does this season still hold the peril of a snowbound city? Of a snowstorm emergency for hundreds of people along some turnpike? Of a train trapped in some blizzardy mountain pass?

If it does, there is strong likelihood that a hospital disaster plan, a county medical society civil defense blueprint, an individual physician's ingenuity will be there to help break the snow barrier which threatens human life. For throughout the medical community there now is realization of poetry perhaps, but not always truth, in John Whittaker Watson's verse:

O the snow, the beautiful snow,
Filling the sky and the earth below.
Over the housetops, over the street,
Over the heads of the people you meet.
Dancing,
Flirting,
Skimming along,
Beautiful snow, it can do nothing wrong.

Renaming an A. M. A. Committee

Meeting a snow emergency is not too different from meeting an enemy attack, insofar as medical preparedness is concerned. Readiness through plan and practice is the key. The A. M. A.'s latest nationwide survey of county medical society activities shows that more than half of the approximately 2,000 societies have committees devoted to civil or disaster defense. But in its continuing effort to emphasize that preparedness for natural disaster automatically equips physicians for war disaster, the A. M. A. Committee on Civil Defense has been confronted with a problem of semantics: Too many people still were thinking only of armed conflict whenever they heard the phase "civil defense." So this month, under authority of the Board of Trustees, the four-year-old Committee headed by Dr. Harold Lueth of Evanston has a new name—Committee on Disaster Medical Care. It will continue to function under the A. M. A. Council on National Defense.

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THE NEPHROTIC SYNDROME

ACCORDING to Kark and co-workers [1] "the metabolic, nutritional and clinical consequences of continued massive albuminuria constitute the nephrotic syndrome." Far from being a single entity, as once thought, it can be produced by a variety of causes which may be grouped as (1) heredofamilial diseases, (2) infections, (3) toxins, (4) allergens, (5) mechanical disturbances, (6) generalized diseases, and (7) intrinsic renal diseases. Pathologically the characteristic lesion is necrosis of the tubules. Clinically the disease is characterized by oliguria, edema, and anorexia, although in many persons it may exist in a subclinical form and be discovered only by a routine urinalysis. In microscopic section the glomeruli may appear to be ischemic, but no change in their structure is seen with the ordinary microscope.[2] Folli and co-workers [3] studied renal biopsy specimens from patients with the nephrotic syndrome by means of an electron microscope. When their first specimen was taken the patient had marked edema and they were able to demonstrate glomerular swelling. The most striking changes were in the epithelial cells whose pedicels had disappeared and were replaced by a continuous layer of epithelial cytoplasm of irregular thickness. After treatment with prednisone only minimal abnormalities were seen in the epithelial cells. A third biopsy specimen, taken after recovery was complete, revealed normal glomerular epithelium.

Although albuminuria is always found in nephrotic patients, albumin makes up only about 70% of the protein lost by these patients through the urine. Due to loss of complement these patients are more susceptible to infection and due to loss of iron-binding proteins they may develop anemia. Renal function tests invariably show evidence of renal impairment.

Because the nephrotic syndrome may arise from so many widely differing causes, no routine treatment can be recommended. Treatment should be directed first of all toward removing the cause, if possible. Above all it must not be assumed that nothing can be done for the patient. Many run a benign course. Restricting the intake of sodium chloride to less than 580 mg. a day will prevent edema, and in the edematous patient this alone will usually initiate diuresis. This can now be readily accomplished by the use of a specially prepared milk powder. Fear that a high protein diet will overwork the kidneys is no longer tenable and, because of the protein loss through the urine, every effort must be made to replace the loss. This is made difficult by the patient's anorexia, but if coaxing and firm encouragement to not overcome this obstacle nasal tube feeding is preferred to intravenous infusions. Supplemental potassium may be required in the early stages. The value of steroid therapy is still undetermined. Although many observers have reported that this treatment reduces edema the relapse rate when treatment is discontinued is high. In the very severe cases it may be necessary to use the artificial kidney for a short period. Through such measures many patients formerly given up as incurable are being saved.

1. Kark, R. M., and others: Nephrotic Syndrome in Adults: Common Disorder with Many Causes, Ann. Int. Med. **49**:751-774 (Oct.) 1958.
2. Hodges, J. H.: Lower Nephron Syndrome, J. M. Soc. New Jersey **54**:11-15 (Jan.) 1957.
3. Folli, G., and others: Electronmicroscopic Studies of Reversible Glomerular Lesions in Adult Nephrotic Syndrome, Ann. Int. Med. **49**:775-795 (Oct.) 1958.

CHANGE OF ADDRESS

If you change your address please notify THE JOURNAL at least six weeks before the change is made. Include the address label clipped from your latest copy of THE JOURNAL, being sure to clearly state both your old and new address. If your city has Postal Zone Numbers, be sure to include this Zone Number in your new address.

ORGANIZATION SECTION

NATIONAL CONFERENCE ON RURAL HEALTH

The Council on Rural Health of the American Medical Association will hold its 14th National Conference on Rural Health, March 5-7, at the Broadview Hotel, Wichita, Kan. The sessions will be attended by physicians, representatives of farm organizations and governmental agencies, and others interested in the problems of rural health. The program follows:

THURSDAY MORNING, MARCH 5

CARLL S. MUNDY, M.D., *Presiding*

8:00 **Registration**
No registration fee

9:45 **Opening Service**
Community Singing
LESTER F. WEATHERWAX
Farm Director, Radio Station KFBI, Wichita, Kan.

10:00 **Invocation**
DR. HOMER K. SCHAFER
Executive Director, Wichita Council of Churches, Wichita, Kan.

10:05 **Greetings**
THE HONORABLE GEORGE DOCKING
Governor of the State of Kansas, Topeka, Kan.

10:10 **Horizons in Rural Health**
F. S. CROCKETT, M.D., Chairman
Council on Rural Health, American Medical Association, Lafayette, Ind.

10:25 **To the Stars Through Difficulties**
LOUIS M. ORR, M.D., President-elect
American Medical Association, Orlando, Fla.

10:45 **The Do It "Yourself" Age**
EARL L. BUTZ, Ph.D.
Dean of Agriculture and Director, Agricultural Extension Service, Purdue University, Lafayette, Ind.
DISCUSSION LEADER
J. P. SCHMIDT, Ph.D.
Extension Professor, Agricultural Extension Service, Ohio State University, Columbus, Ohio

11:40 **Luncheon Period**

THURSDAY AFTERNOON

ALLEN T. STEWART, M.D., *Presiding*

2:00 **Community Singing**

2:05 **Experiment in Community Health Participation**
Moderator: V. E. WILSON, M.D.
Assistant Dean, University of Kansas, School of Medicine, Kansas City, Kan.

3:30 **Milk Break**

3:40 **Workshop (Continued)**

4:15 **Discussion**

THURSDAY EVENING

CARROLL B. ANDREWS, M.D., *Presiding*

8:00 **Recreational Program**
Youth's Showcase
Presentation by Agricultural Extension Service, Kansas State Agricultural College, Manhattan, Kan.
Our Community's Answer
Spirit of Kansas
A vocal and instrumental presentation

FRIDAY MORNING, MARCH 6

W. A. WRIGHT, M.D., *Presiding*

9:00 **Community Singing**

9:05 **Rural Health Count-Down**
J. D. SMERCHEK
Kansas Farm Bureau, Manhattan, Kan.

9:30 **Grange Thinking on the Rural Health Front**
ROY BATTLES
Assistant to the Master, The National Grange, Washington, D. C.

9:35 **Who Will Harvest My Wheat**
AUBREY D. GATES, Director, Division of Field Services, American Medical Association, Chicago

9:50 **Discussion**

10:10 **Milk Break**

10:20 **Family Physician and the Cost of Medical Care**
CONRAD BARNES, M.D.
Seneca, Kan.

10:35 **The Best Buy in Insurance**
CHARLES H. COGHLAN
Executive Vice-president, Ohio Medical Indemnity, Inc., Columbus, Ohio

10:50 **The Hospital Dollar**
JOHN POND
Management Consultant to the Larimer County Hospital, Boulder, Colo.

11:10 **Discussion**

11:45 **Luncheon Period**

FRIDAY AFTERNOON

F. A. HUMPHREY, M.D., *Presiding*

2:00 **Community Singing**

2:05 **How Hospitals Get People Well**
C. R. BROTT, M.D.
Beatrice, Neb.

2:20 **Mental Health as a Part of General Practice**
ALONZO P. PEEKE, M.D.
Volga, S. D.

2:35 **The New Era of Aging**
FREDERICK C. SWARTZ, M.D.
Chairman, Committee on Aging, American Medical Association, Lansing, Mich.

2:50 **Discussion**

3:15 **Milk Break**

3:25 **Horizons in Mental Health**
PRESCOTT W. THOMPSON, M.D.
Director, Out-Patient Service, The Menninger Clinic, Topeka, Kan.

4:00 **Discussion**

FRIDAY EVENING

F. S. CROCKETT, M.D., *Presiding*

7:00 **Banquet**
Invocation
THE REVEREND DONALD FROGGE
Pastor, Upland–Alida Parish, Junction City, Kan.
INTRODUCTION OF SPECIAL GUESTS
Greetings
Woman's Auxiliary, American Medical Association
MRS. E. ARTHUR UNDERWOOD, President
Vancouver, Wash.

Student American Medical Association
WILLIAM KIRKHAM, Treasurer
Oklahoma City
MUSICAL INTERLUDE
The Fifth Dimension
T. P. BUTCHER, M.D., President
Kansas Medical Society, Emporia, Kan.

SATURDAY MORNING, MARCH 7

NORMAN H. GARDNER, M.D., *Presiding*

9:00 Community Singing
9:05 This We Know
MRS. E. ARTHUR UNDERWOOD, D.D.S.
President, Woman's Auxiliary, American Medical Association, Vancouver, Wash.
9:25 Progress in the Control of Some Diseases of Animals Affecting the Rural Health
MARTIN P. HINES, D.V.M.
American Veterinary Medical Association, Raleigh, N. C.
9:45 Discussion
10:10 With Your Apron On or Off
MRS. KENNETH D. SCHNEIDER
Nashville, Ind.
10:25 Discussion
10:35 Recess
10:45 Ideas Pay Off in Action
PAUL C. JOHNSON
Editor, *Prairie Farmer*, Chicago
11:05 Discussion
11:15 Rural Health—Past, Present, and Future
FRANKLIN P. MURPHY, M.D.
Chancellor, University of Kansas, Lawrence, Kan.

DR. YODER JOINS HEADQUARTERS STAFF

Dr. Franklin C. Yoder of Cheyenne, Wyo., was appointed director of the Division of Socioeconomic Activities effective Jan. 1. He received his M.D. degree from the University of California and was in private practice from 1940 to 1947, when he became director of the Wyoming Department of Public Health, a position he has held until assuming his present duties. He was the secretary-treasurer of the Association of State and Territorial Health Officers, 1954-1956, and is the immediate past-president of that organization. He is a member of the Health Resources Advisory Committee, Office of Civil and Defense Mobilization, a commissioner of the Western Interstate Commission on Higher Education, and editor of the Wyoming section of the *Rocky Mountain Medical Journal*. In 1957 he was a member of the U. S. Delegation to the World Health Organization and of the Virus Research and Epidemiology Committee of the National Foundation for Infantile Paralysis. He is a diplomate of the American Board of Preventive Medicine. The following department heads will be under his administrative direction: Director, Bureau of Health Education; Director, Economic Research Department; Secretary, Council on Industrial Health; Secretary, Council on National Defense; Secretary, Council on Medical Service; Secretary, Council on Rural Health; and medical representatives, Washington, D. C.

NEW INDUSTRIAL HEALTH PAMPHLET

The Council on Industrial Health now has a new pamphlet entitled "Guide for Medical Services for Construction Projects." Single copies will be sent free on request, and prices on multiple copies will be furnished on request.

CORRESPONDENCE

SMALLPOX VACCINATION

To the Editor:—Here in Baltimore we heartily agree with your editorial, "'Immune' or 'No Take' Reaction in Smallpox Vaccination" (*J. A. M. A.* **168:**1900 [Dec. 6] 1958). Under the state of Maryland compulsory vaccination law, no child is allowed to attend public school without evidence of a successful vaccination against smallpox. The teachers and school nurses are instructed not to accept certificates with "immune reaction" or "no take" written on them. All such children are referred back to their family physicians or to the health department for revaccination. During 1957, 63 children were referred to the health department; of these, 34 gave primary reactions and 14 vaccinoid reactions on revaccination.

The importance of keeping the vaccine on ice during storage is dramatically impressed on all medical students attending both the Johns Hopkins and the University of Maryland schools of medicine in an annual lecture by Dr. Huntington Williams, the commissioner of health of Baltimore. During the entire lecture on smallpox vaccination, the vaccine is placed on a 200-lb. cake of ice which sits on the table between Dr. Williams and the class. The fact that former students of over 20 years ago still remember this lecture with its cake of ice bears testimony to its effectiveness as a teaching method.

ROBERT E. FARBER, M.D.
Baltimore City Health Department
Baltimore, Md.

To the Editor:—With regard to THE JOURNAL editorial, "'Immune' or 'No Take' Reaction in Smallpox Vaccination," attention is invited to my note in *GP* (**5:**50 [June] 1952) which sets forth the basic facts of reading smallpox reactions. This is the system that was taught at the U. S. Army Medical Field Service School. Smallpox vaccinations should be seen two or three days after vaccination, for the "immune reaction" disappears by the end of the week. Several "negative" revaccinations noted at the

end of the week and absence of an "immune reaction" on the second or third day may indicate that a worthless vaccine has been used. It should again be emphasized that every vaccination made with a potent vaccine will take, but, as the editorial in THE JOURNAL states, unless the site is examined on the third and seventh days the "immune reaction" will be missed.

EDWIN MATLIN, M.D.
27 Baltimore St.
Mt. Holly Springs Pa.

Dr. Matlin's letter was referred to the U. S. Army Surgeon General's Office, and Col. Arthur P. Long, Chief of the Preventive Medicine Division, replied as follows:

To the Editor:—Dr. Matlin's note published in *GP* is essentially in accord with smallpox vaccination practice as outlined in TB Med 144 and as currently presented at the Army Medical Service School. Throughout the publication the Army stresses the fact that no vaccination should be considered to be completed until it has been interpreted and the type of reaction recorded on the immunization recorded. Medical officers are instructed as to the importance of reading vaccinations two or three days after they are administered and at the end of one week if no reaction is observed at the first reading. The fact is stressed that the patient's word as to the presence of a reaction is not acceptable as evidence of a "take."

Col. ARTHUR P. LONG (MC)
Office of the Surgeon General
Washington 25, D. C.

COUNCIL ON DRUGS

To the Editor:—I wholeheartedly agree with the comment by Dr. S. P. Leinbach (*J. A. M. A.* **169:**69 [Jan. 3.] 1959) regarding the excellent help available to practicing physicians, if they will only take advantage of it. The A. M. A. Council on Drugs is one of the best sources of sound information that physicians can get on the tremendous number of new drugs that are now being offered by fast-talking detailmen and flamboyant advertisements from even the best pharmaceutical companies. Good medicine cannot be practiced if physicians do not give careful attention to the choice of the drugs they use. New drugs are carefully scrutinized by the Council on Drugs. Reports are made frequently in THE JOURNAL and are included for description in New and Nonofficial Drugs. New drugs are so well appraised by the Council on Drugs and the reports are so well made on them that New and Nonofficial Drugs is one of the best current books available on modern pharmacology.

Certain essential facts and information which physicians must have about every drug in order to use it wisely are what it is and what its chemical relatives are; how quickly it is absorbed, metabolized, and removed from the body; what the safety range is between the dosage that is required to give the effect desired and the dosage that may cause some untoward effects; what the drug actually does to the cells, tissues, and organs of the body; and what the indications are for its effective use. This information is given by the Council on Drugs. This is the sort of information that physicians should insist that detailmen be prepared to give them and that advertisements should contain. Surely advertisements with this sort of information would be more appropriate to the dignity of the medical profession than are some of those which now flood medical journals. Physicians should strongly support the work of the Council on Drugs. More important, it will be to the practical advantage of physicians to follow the advice and service rendered by the Council.

CHAUNCEY D. LEAKE, Ph.D.
College of Medicine
The Ohio State University
Columbus 10.

LOWERING BLOOD LIPID LEVELS

To the Editor:—The excellent article "Lowering Blood Lipid Levels by Changing Food Patterns," which appeared in THE JOURNAL (**168:**1989-1995 [Dec. 13] 1958), is one of the first practical articles dealing with the use of vegetable oils as replacement of solid fat in the diet to decrease the serum cholesterol level. The authors are to be complimented for their reasonable approach to a complex dietary problem and for again confirming the cholesterol-depressing effect found by earlier investigators. There are some statistical errors in the article in connection with the availability of certain oils. The article states that a bushel of corn produces only 0.75 lb. of oil. Practical corn oil refinery operations yield about 2 lb. of oil per bushel of corn. The actual amount of oil present in the grain itself is about 4% of the total weight. The impression that corn oil is not readily available should be corrected. The salad and cooking oil market of the United States approximates 300,000,000 lb. of product annually sold through retail grocery outlets. Of this, corn oil accounts for more than 33%. Much larger amounts of corn oil can be made available when needed. Mazola Pure Corn Oil, produced by Corn Products Company, is available in practically every grocery store in this country at prices competitive with those of other domestic oils. Many of the investigators working in the field of serum cholesterol depression used corn oil in their studies, and often it was considered the standard reference oil for evaluation.

ROBERT G. RUARK
Corn Products Company
17 Battery Pl.
New York 4.

MEDICAL NEWS

ARKANSAS

Institute in Psychiatry and Neurology.—The Veterans Administration Hospital, North Little Rock, will hold its 11th annual Institute in Psychiatry and Neurology, Feb. 26-27. Out-of-state participants will include the following:

Dr. Kenneth E. Appel, Ardmore, Pa.; Dr. Leo H. Bartemeier, Baltimore; Mr. Clark W. Blackburn, New York City; Dr. J. B. Bounds, Roanoke, Va.; Dr. Dexter Bullark, Rockville, Md.; Dr. Francis J. Gerty, Chicago; Dr. J. McV. Hunt, Urbana, Ill.; Dr. Bernard I. Kahn, San Francisco; Dr. Edith M. Lentz, Minneapolis; Dr. S. J. Muirhead, Salisbury, N. C.; Dr. G. Wilse Robinson Jr., Kansas City, Mo.; Dr. Mathew Ross, Washington, D. C.; Dr. R. T. Westman, St. Louis; and Dr. Stewart G. Wolf, Oklahoma City, Okla.

The annual dinner the evening of Feb. 26 will be co-sponsored by the Arkansas Psychiatric Society, Arkansas Association for Mental Health, Arkansas Psychological Association, and North Little Rock VA Hospital. Dinner speakers will include Dr. L. A. McDaniel, past-president of the Arkansas Medical Society, Tyronza, and Dr. Bartemeier. For information write Dr. H. W. Sterling, Manager, Veterans Administration Hospital, North Little Rock, Ark.

CALIFORNIA

Symposium on Enzymes.—A three-day program on "Basic and Clinical Aspects of Enzymes" will be given April 2-4 at the University of California Medical Center, San Francisco. A staff of more than 20 specialists will take part in the symposium. Guest speakers include Dr. Oscar Bodansky, New York City; Dr. Roscoe O. Brady, Bethesda, Md.; David E. Green, Ph.D., Madison, Wis.; Hans F. Jensen, Ph.D., Fort Knox, Ky.; Juda H. Quastel, Ph.D., Montreal; Sidney Weinhouse, Ph.D, Philadelphia. For information and application write Dr. Seymour M. Farber, Department of Continuing Medical Education, University of California Medical Center, San Francisco 22.

Dedicate Biophysics Laboratory.—Dedication ceremonies for Stanford University's new $124,000 Biophysics Laboratory were held Jan. 10. Detlev W. Bronk, LL.D., president, Rockefeller Institute for Medical Research and the National Academy of Sciences, was the speaker, and Stanford president Wallace Sterling and other university officials were hosts for the day-long dedication ceremonies. A scientific session was held in the morning, followed in the afternoon by a tour of the new facilities and Dr. Bronk's address. Dr. Henry S. Kaplan, who heads the new laboratory, was in charge of the program. The new Stanford Biophysics Laboratory houses studies on x-ray microscope development, radiation physics, experimental electron therapy of cancer, cell physiology, and the biological role of free radicals. The laboratory also will provide temporary research space for Joshua Lederberg, Ph.D., co-winner of the 1958 Nobel Prize in medicine. He will head a new department of genetics in the Medical School.

Physicians are invited to send to this department items of news of general interest, for example, those relating to society activities, new hospitals, education, and public health. Programs should be received at least three weeks before the date of meeting.

DISTRICT OF COLUMBIA

Annual Lecture.—The Psi Chapter of the Phi Delta Epsilon Fraternity will hold the Aaron Brown Lectureship April 4 in The George Washington University School of Medicine, Hall A, Washington, D. C. The guest speaker will be Dr. Waldo E. Nelson, professor of pediatrics, Temple University School of Medicine, and medical director St. Christopher's Hospital for Children, Philadelphia. His subject is "Antenatal Origin of Disease."

University News.—Dr. Desmond S. O'Doherty, associate professor of neurology in the Georgetown University School of Medicine, has taken over the duties of Dr. Francis M. Forster in the direction of the department of neurology. Dr. Forster, chairman of the department and former dean of the Medical School, has resigned to accept a position as director of the department of neurology at the University of Wisconsin, Madison. A native of Ireland, Dr. O'Doherty joined the Georgetown faculty in 1951.

Dr. Copeland Named Chairman of Cancer Committee.—Dr. Murray M. Copeland, director, department of oncology, Georgetown University School of Medicine, was recently elected chairman of the Joint Committee for Cancer Staging and End Results Reporting. This group, whose purpose is to formulate a program of cancer staging and end results reporting for the American medical profession, is composed of members and alternates designated by the American College of Physicians, the American College of Surgeons, the American College of Radiology, the College of American Pathologists, the American Cancer Society, and the National Cancer Institute.

GEORGIA

Seminar of Pathologists in Atlanta.—The third annual seminar of the Atlanta Society of Pathologists will be held April 11-12 in Atlanta. Various workshops will be held April 11 and a seminar and panel discussion on neuropathology will be given April 12. Dr. James W. Kernohan will serve as moderator for the morning seminar, and Drs. John E. Whiteleather, William H. Sweet, and Kernohan will participate in the afternoon panel discussion. For information write Dr. John T. Godwin, 265 Ivy St., N. E., Atlanta 3, Ga.

HAWAII

Golden Jubilee of Children's Hospital.—The Honolulu Pediatric Society is sponsoring the Golden Jubilee Celebration of Kauikeolani Children's Hospital April 19-22, in Honolulu. Guest participants for the scientific program will be Drs. James R. Gallagher, chief, Adolescent Unit, Children's Medical Center, Boston, and Tague C. Chisholm, assistant clinical professor of surgery, University of Minnesota, Minneapolis. Topics will be centered on problems of adolescent and pediatric surgery. Reservations may be made with the Golden Jubilee Committee, Children's Hospital, Honolulu, T. H., or directly through the American Academy of Pediatrics, % Dr. E. H. Christopherson, 1801 Hinman Ave., Evanston, Ill. Princess Kaiulani Hotel Meeting House will be the center for the scientific sessions.

ILLINOIS

Hospital Lecture.—The sixth lecture in the ninth annual North Shore Hospital Lecture Series on "Emotional Forces in the Family" will be held at the hospital, 225 Sheridan Road in Winnetka, March 4, 8:00 p. m. "The Impact of Aging in the Family" will be discussed by Dr. Donald G. McKerracher, professor of psychiatry, University of Saskatchewan. The Commission on Education of the American Academy of General Practice has approved these lectures for category II credit. Dr. McKerracher has agreed to answer questions after his presentation. All physicians and allied professional personnel are cordially invited.

Chicago

Dr. Lull to Lecture.—Dr. George F. Lull, who resigned recently as assistant to the president of the American Medical Association, will present the sixth of a series of lectures on the history of surgery and related sciences Feb. 24, 8 p. m., at the International Surgeons Hall of Fame, 1524 Lake Shore Drive. Dr. Lull's subject will be "Notes About the Role of Physicians in Our Military History." The lecture is open to physicians, medical personnel and students, and to the public. There is no admission charge, but accommodations are limited to 300. For reservations write Dr. Ross T. McIntire, Executive Director, International College of Surgeons, 1516 Lake Shore Drive, Chicago 10.

Public Schools Need Physicians.—The Board of Education of the City of Chicago needs a full-time medical officer and 4 part-time medical officers, one of whom is a psychiatrist. The medical activities include the operation of a comprehensive school health program involving 100 teacher-nurses and screening procedures with respect to hearing, vision, cardiac abnormalities, and other phases of health services to children. Among other things this staff conducts the physical examination of employees when they are first employed and special examinations from time to time of other employees. Applications should be sent to the General Superintendent of Schools, 228 N. LaSalle St. Salaries for part-time medical personnel range from $600 to $900 per month; full-time medical personnel, from $12,000 to $17,000 per year.

Establish Professorships in Nutrition and Metabolism.—Two professorships in nutrition and metabolism, reportedly the first to be endowed specifically in this field in a medical school, have been established at the Northwestern University medical school. Each chair is endowed for a half million dollars, made possible through the efforts of the Spies Committee for Clinical Research, made up of educators, industrialists, and scientists dedicated to support the work in nutrition begun to Dr. Tom D. Spies, chairman, department of nutrition and metabolism at Northwestern Medical School, and scientific director, Nutrition Clinic, Hillman Hospital, Birmingham, Ala. The university named the first chair the Tom D. Spies Professor of Nutrition and Metabolism. It will be awarded to Dr. Robert E. Stone, professor of nutrition and metabolism at Northwestern. The second professorship, as yet unnamed, will be held by Dr. Spies.

Establish Unit on Nuclear Medicine.—Dr. Lowell T. Coggeshall, dean of the University of Chicago Division of Biological Sciences, announced the establishment of the Section on Nuclear Medicine in the School of Medicine. He said it will deal with the full range of atomic public health problems from atmosphere to zoology. The Rockefeller Foundation approved support for the new unit of up to $500,000 and the university and other sources will provide additional funds. The types of problems the new section will explore are (1) the increase in natural background radiation due to by-products of all current uses of nuclear energy devices; (2) the actual or probable consequences—genetic and physiologic—of the increased exposure

of man and domestic animals to ionizing radiation; (3) legislative controls of factors responsible for increased exposure to radiation; (4) medico-legal aspects of personal injury and compensation of personnel engaged in the nuclear energy industry; and (5) the psychological reactions of society to the threatening aspects of nuclear energy.

MASSACHUSETTS

Hospital Seminar in Holyoke.—Dr. Franz J. Ingelfinger, of Boston University School of Medicine, and Dr. Charles S. Welch, of Albany Medical College, will present the semi-annual Providence Hospital seminar in Holyoke March 4. Their subject is medical and surgical aspects of gastroenterology. For information write Dr. Richard J. Maher, 197 Chestnut St., Holyoke, Mass.

MARYLAND

Conference on Television in Medical Education.—"The Future of Television in Postgraduate Medical Education" will be the subject of a conference to be held Feb. 28–March 1 at the Clinical Center, National Institutes of Health, Bethesda. The conference will be held under the auspices of the Institute for Advancement of Medical Communication, with the American Academy of General Practice acting as co-sponsor. Participants will include experts in the field of medical television and those charged by professional organizations with responsibility for planning and conducting television programs designed for postgraduate medical audiences. Attendance is by invitation. For information write Dr. Richard H. Orr, Executive Director, Institute for Advancement of Medical Communication, 33 E. 68th St., New York 21.

MICHIGAN

Fellowship in Public Health.—A $2,500 graduate fellowship in public health is being offered by the Michigan Tuberculosis Association. The Werle–Bennett Graduate Fellowship is open to residents of Michigan with a bachelor's degree from a recognized college or university. Applicants must be qualified for admission to the University of Michigan School of Public Health but may study at any public health school. Applications should be made by April 1. Information and application blanks may be gotten from the Michigan Tuberculosis Association, 403 Seymour Ave., Lansing, Mich. The grant was set up "to encourage people to enter the tuberculosis and public health fields and to encourage graduate study." Recipients of the fellowship will be expected to work in Michigan for a voluntary tuberculosis association or in public health for two years following graduation. The fellowship was named in honor of Theodore J. Werle, executive secretary of the Michigan Tuberculosis Association for 35 years, and Harry D. Bennett, who has served since 1922 as treasurer of the association. Christmas Seal contributions finance the fellowship.

Mexican Students Attend University Seminar.—Fifteen senior medical students from the National University of Mexico arrived in Ann Arbor Jan. 30 for a month-long seminar at The University of Michigan Medical Center. Arranged by the two Universities through the U. S. Department of State, the seminar reportedly is expected to open greater professional exchanges within the Americas. The Mexican students began regular classes Feb. 2. Visiting students, paired with a senior in the U-M Medical School, attend regular classroom activities and clinical sessions. The 15 are divided according to special fields of interest, including medicine, surgery, obstetrics, radiology, pediatrics, and psychiatry. Medical coordinator of the seminar is Dr. Sibley W. Hoobler, of the department of internal medicine, who previously had flown to Mexico City to select the 15 visitors from 30 candidates chosen by the faculty of the National University. Chosen on the basis of grades, personality, and potential for future leadership in medicine, the group represents the top 5% of the senior class at the University of Mexico Medical School, reportedly the oldest medical school in the Americas. Following their month-long experience at the University of Michigan, the visitors will make a two-week tour of the northeastern U. S. to Cleveland, Ohio (March 1), Buffalo and Albany, New York (March 2-3), Boston, Mass. (March 4-6), New York City (March 6-9) and Washington, D. C. (March 9-15).

MISSISSIPPI

Symposium on Psychosomatic Obstetrics–Gynecology.—The University of Mississippi School of Medicine will hold its first Symposium on Psychosomatic Obstetrics–Gynecology March 4 at the University Medical Center, Jackson. The symposium has been accepted for credit by the American Academy of General Practice. The guest speakers will be Dr. Harry Fields, associate professor of obstetrics and gynecology, University of Pennsylvania School of Medicine, Philadelphia; Dr. James H. Ferguson, chairman, obstetrics and gynecology, University of Miami School of Medicine; and Dr. Phineas J. Sparer, professor of psychiatry and preventive medicine, University of Tennessee School of Medicine, Memphis. Drs. Michael Newton, Floy J. Moore, Blanche Lokard, Walter H. Simmons, and Clarence G. Sutherland, of the Medical School faculty in Jackson, also will lecture.

MISSOURI

Dr. Comroe to Lecture.—The University of Missouri School of Medicine, Columbia, will be visited by Dr. Julius H. Comroe Jr., professor of physiol-

ogy and director of the Cardiovascular Institute, University of California Medical School, San Francisco, March 5, 6, and 7. He will deliver a lecture on "Contributions of Pulmonary Physiology to Clinical Medicine" as part of the Squibb Centennial Lecture Program.

NEW YORK

New York City

Physicians' Art Exhibit.—The 24th annual "Exhibition of Physicians' Art," sponsored jointly by the New York Academy of Medicine and the New York Physicians Art Club, opened at the New York Academy of Medicine the evening of Jan. 26, closing Feb. 2. Only the works of physicians were exhibited, all of whom are amateur artists. The media included were oils, water colors, prints, drawings, sculptures, ceramics, and photographs. The exhibition was arranged by Dr. Albert C. Santy, chairman of The New York Academy of Medicine Art Committee, and Dr. Kurt F. Falkson, of the New York Physicians Art Club.

Health Careers Week.—New York City's first Health Careers Week was proclaimed by Mayor Robert F. Wagner Jan. 27. Sponsored by the Community Council of Greater New York, Health Careers Week "reflects the mounting concern felt by health agencies because of the extreme shortage of health personnel." According to Carl M. Loeb Jr., president of the Community Council, Health Careers Week (Feb. 1-7) is an attempt to alert the public to this important problem. Events planned around this week included changing the street sign of Times Square to Health Careers Square by Dr. Leona Baumgartner, honorary chairman of Health Careers Week, and two students; one student acted as commissioner of health for Feb. 2; the second student was invited to act as commissioner of hospitals for a day; a new pamphlet, "Opportunities for Careers in Health," published by the Community Council was distributed to schools and libraries.

PENNSYLVANIA

Philadelphia

Australian Lecturer.—Sir John Eccles, professor of physiology, John Curtin School of Medical Research, Australian National University, Canberra, Australia, will be a guest of Temple University on Feb. 23-24. Under the sponsorship of the Squibb Centennial Lecture Committee, he will lecture to the faculty and students of the School of Medicine on Feb. 23, 4:00 p. m., in the auditorium.

TEXAS

Rehabilitation Institute Opening.—The Texas Institute for Rehabilitation and Research, newest member of the Texas Medical Center team, opened officially the week of Jan. 19, Dr. William A. Spencer, chairman, department of rehabilitation, announced. Formal dedication of the new institute will be held in May. Dr. Spencer said it is planned to move patients from the Wolff Home Polio Rehabilitation Unit and from the Southwestern Poliomyelitis and Rehabilitation Center. The new building of the Texas Institute for Rehabilitation and Research and its equipment cost about $1,650,000. It has a 54-bed capacity and an area of 80,000 square feet. In addition there are laboratories and special study areas for research. It will be staffed by 80 professionals under the direction of Dr. Spencer and will require a total staff, including nonprofessionals, of 240 people.

VIRGINIA

Annual Hospital Postgraduate Program.—The Roanoke Memorial Hospital will hold its 10th annual postgraduate day program March 19 at Hotel Roanoke. Registration begins at 1:00 p. m. and the program at 2:00 p. m. The meeting is open to interested physicians and is approved for category I credit by the American Academy of General Practice. The program includes:

Pyelonephritis and Hypertension in Pregnancy Masquerading as Toxemia, Dr. Frank A. Finnerty, Georgetown University Medical School, Washington, D. C.

Transaminase and Other Serum Enzyme Tests in Clinical Medicine, Dr. Felix Wroblewski, Cornell University Medical School, New York City.

Functional Gastrointestinal Disease, Dr. Dwight L. Wilbur, Stanford University Medical School, San Francisco.

Experience with Transplantation of the Human Kidney and Renal Hypertension, Dr. J. Hartwell Harrison, Harvard Medical School, Boston.

For information write Dr. Charles L. Crockett Jr., Chairman, Medical Education Committee, Roanoke Memorial Hospital, Roanoke, Va.

WEST VIRGINIA

Poison Control Center in Weston.—The *West Virginia Medical Journal* of January reported that the state's first complete Poison Control and Information Center was set up at the Stonewall Jackson Memorial Hospital in Weston. Reportedly, there are but 26 other such centers in the United States. Carl F. Cline, hospital administrator, announced that the center will be operated on a 24-hour basis and will be available to physicians and hospitals throughout the state. Ninety-five antidotes are stored in the cabinet which will be kept at the hospital, along with two books, "Handbook of Emergency Toxology," and "Clinical Toxology of Commercial Products," which provide sufficient information to combat more than 20,000 different types of poisoning. The books contain a complete list of preparations, name their toxic elements, and supply the recommended antidotes and supportive or follow-up treatment. The center was donated to the hospital by Minter B. Ralston and

his son, Minter B. Ralston III, Weston pharmacists. All physicians and hospitals throughout the state may avail themselves of the services of the center when the need arises. The telephone number at the Stonewall Jackson Memorial Hospital in Weston is 1775.

WISCONSIN

Polish Visitor.—Dr. Zdzislaw Stolzmann, dean of the Medical School, Poznan, Poland, was a recent visitor to the University of Wisconsin, Madison. On Jan. 10, he visited the Medical Center under a Rockefeller grant, to discuss "The Experimental Program in Medical Education."

GENERAL

Report on Heart Fund.—Contributions to the 1958 Heart Fund totaled a record $22,345,718, Charles Perry McCormick, Baltimore industrialist and national campaign chairman announced. This was a gain of more than 2 million dollars over the $20,563,929 contributed to the Heart Fund in 1957. More than 9 million dollars of the 1958 total resulted from Heart Sunday collections conducted by over 1,500,000 volunteers visiting about 20,000,000 homes of their neighbors in 5,500 communities in a single day. The 1959 Heart Fund campaign will be conducted throughout the month of February by the American Heart Association and its affiliates. Heart Sunday will be observed on Feb. 22.

Plastic Surgeons Meeting in New York City.—The spring meeting of the American Society of Facial Plastic Surgery will be held March 18 at the Hotel Elysee, 60 E. 54th St., New York City. The program includes the following papers:

Surgical Correction of Protruding Deformed Ears, Dr. Oscar J. Becker, Chicago.
Management of Inferior Crus in Otoplasty, Dr. Sidney S. Feuerstein, New York City.
The Problem of Implants in Rhinoplasty, Dr. Samuel M. Bloom, New York City.

The business meeting will be held at 5:30 p. m. and the dinner ($12) at 7:00 p. m. For information write Dr. Samuel M. Bloom, 123 E. 83rd St., New York 28.

Meeting on Forensic Sciences in Chicago.—The 11th annual meeting of the American Academy of Forensic Sciences will be held Feb. 26-28 at the Drake Hotel, Chicago. The program includes two symposiums, "Developments in Forensic Science in 1958" and "Investigation of Potential Suicides." Foreign participants include: W. Allan Cregeen, FRCS, Toronto, Canada; D. Alan Eagleson, B.S. and L. Monkman, M.S., Toronto, Canada; C. G. Farmilo, Ph.D., Ottawa, Canada; and Dr. Francis E. Camps, London, England. Dr. Russell S. Fisher, Baltimore, is chairman of the program committee. The general business meeting will be held at 5 p. m., Feb. 26. For information write Dr. W. J. R. Camp, 1853 W. Polk St., Chicago 12, Secretary-Treasurer.

Three Health Experts Visit South Africa.—Dr. Arthur J. Vorwald, of Wayne State University College of Medicine, Detroit, Theodore F. Hatch, professor of industrial health engineering, University of Pittsburgh, and Dr. Oscar A. Sander, of Milwaukee, were among the 15 representatives from seven countries who met in South Africa Feb. 9-21 to discuss their problems with pneumoconiosis in Johannesburg with scientists from the United Kingdom, Belgium, Germany, France, Switzerland, and Northern Rhodesia at the invitation of the Pneumoconiosis Research Unit of the South African Council for Scientific and Industrial Research. In addition to giving a series of papers, the delegates visited uranium mines and their medical clinics.

Health Bequests in 1958.—Eighty-two gifts and bequests each of a million dollars or more and totaling over a half billion dollars were made to American philanthropy in 1958, the current *Bulletin* of the American Association of Fund-Raising Counsel, Inc., has reported. The compilation showed that health and welfare received the greater proportion of the bequests, while education received the bulk of gifts made by living donors. Of the $544,840,902 total, $296,263,781 went to health and welfare causes, $159,802,121 to education, $16,275,000 to religious causes, and $72,500,000 to the fine arts. The American Association of Fund-Raising Counsel is an organization of 27 firms which specialize in counseling on and management of fund campaigns for philanthropic organizations. Its membership covers the United States and Canada.

Assessment of Hospital Medical Staffs.—At its meeting Nov. 21 the Board of Trustees of the American Hospital Association adopted the following statement which was prepared by the Council on Planning, Financing and Prepayment on the subject of assessment of hospital medical staffs:

To advise member hospitals that:
a. It is improper in principle to assess medical staff members on a compulsory basis for the day-to-day operation of the hospital.
b. New hospital construction should be in response to a community need recognized not only by the hospital governing board but also by the hospital medical staff.
c. It is vital to the success of a hospital's fund-raising campaign that the support and interest of the hospital medical staff be obtained prior to the campaign.
d. Giving by the hospital medical staff should be on a voluntary basis, its campaign quota being set jointly by the hospital governing board and the hospital medical staff.

Dr. Edwin L. Crosby, 18 E. Division, Chicago 10, is director of the American Hospital Association.

Biological Photographers Meet in Iowa City.—The first Midwestern sectional meeting of the Biological Photographic Association will take place April 24-26 at the University of Iowa, Iowa City. Photographic specialists in medicine, dentistry, biology, and other sciences will attend, representing medical and dental schools, hospitals, research institutions, and science centers from Canada and nine states (Illinois, Iowa, Kansas, Minnesota, Missouri, Nebraska, North and South Dakota, and Wisconsin). A salon of color and black-and-white photographs will feature displays of clinical and specimen photography, photomicrography, and natural science. A motion-picture program is scheduled for April 24. The Biological Photographic Association was founded at Yale University in 1931 and has a world-wide membership. For information write Mr. Carroll H. Weiss, Director of Professional and Press Publicity, 160 Riverside Dr., New York 24.

Call for Decennial Pharmacopeial Convention.—In compliance with the provisions of the constitution and by-laws of the United States Pharmacopeial Convention, the several bodies that are believed to be entitled to representation at the 1960 decennial meeting of the convention are invited to appoint one delegate and one alternate to the meeting, to be held at the Hotel Statler, Washington, D. C., April 12-13, 1960. The constitution requires that each delegate and each alternate be an officer or a member of the academic staff of the college or school, or an active member of the association or society, or an employee of the division of federal government, that he represents. Credential forms will not be distributed until about Nov. 1, 1959, to be returned by Feb. 1, 1960. The names of delegates and alternates should not be sent until after receipt of the credential forms next November. Correspondence should be directed to the Secretary, Adley B. Nichols, 46 Park Ave., New York 16.

Seminar Cruise to Caribbean.—The fourth Postgraduate Medical Seminar Cruise, sponsored by Duke University School of Medicine, Durham, N. C., will begin April 2, sailing from New York to return April 14 (12 days) and calling seven hours at Wilmington, N. C. April 4 to visit the Orton Plantation and view the annual Azalea Festival. An alternate plan is to sail from Wilmington, N. C., April 4, to return April 13 (9 days). Ports of visit will include Nassau, Port-au-Prince, Kingston, and Cap Haitien. The faculty will include Drs. William McNeal Nicholson, professor of medicine and director of postgraduate education; Julian M. Ruffin, professor of medicine; and Doris A. Howell, department of pediatrics. The medical program constitutes 20 hours of formal teaching toward the 150 hours of postgraduate study required every three years. A certificate of attendance will be issued. For information address: Director of Postgraduate Education, Duke University School of Medicine, Durham, N. C.

Photographic Exhibit at Student Convention.—A new Student American Medical Association photographic salon to exhibit "the best medical and general interest photographs in the country" is scheduled for the 1959 convention in Chicago, April 30-May 3. Medical students, interns, residents, and new physicians are eligible to participate. The two-part exhibition will be an annual event. Leitz awards will include Leica cameras and accessories as first prizes for each of the two categories. The aim of this photographic program is to encourage physician-photographers both in the scientific area and in photography as a fine art. Participants are asked to submit black and white prints of general interest photographs (preferably 11 x 14 in.) and color transparencies of medical photographs as soon as possible. Deadline is March 1. SAMA's address is 430 N. Michigan Ave., Chicago 11. Fifty of each of the two categories will be selected for exhibition. The two top awards are for the best medical picture and for the best general interest black and white photograph.

Dr. Nelson Passes Japanese Qualifying Examinations.—The world headquarters of Seventh-Day Adventists, Washington, D. C., has announced that Dr. Richard A. Nelson, a Seventh-Day Adventist physician at the church's Tokyo Sanitarium and Hospital, has become the first Caucasian physician to pass Japanese medical qualifying examinations given in the Japanese language. Six years ago Japan changed its medical examining system by announcing that any physician desiring medical practice credentials in Japan must take examinations in the Japanese language. A graduate of the College of Medical Evangelists (in 1951) at Loma Linda, and Los Angeles, Calif., Dr. Nelson went to Japan in December, 1953, after completing a surgical residency at the White Memorial Hospital, Los Angeles. Since arriving in Japan he has been studying for the examination, learning nearly 4,000 special Japanese characters of a purely medical nature. A total of 417 persons took the examinations in Tokyo; 203 passed. Dr. Nelson passed his Canadian medical examinations before going to the Far East in 1953 as a "fire-escape" to practice in British countries in case he did not pass the Japanese test. He will be a staff physician at the Adventists' 100-bed Tokyo Sanitarium and Hospital.

Obstetricians and Gynecologists Hold Annual Meeting.—The American College of Obstetricians and Gynecologists will hold its annual meeting in Atlantic City, April 6-8, with general sessions in Convention Hall. The program will include papers by obstetricians and gynecologists from all parts of

the country, breakfast and clinical conferences, panels, motion-picture programs, and scientific exhibits. One panel will deal with radiation hazards in obstetrics and gynecology, and another will cover psychosomatic aspects. A feature will be the presentation of 12 research project reports, to include the early diagnosis of multiple pregnancy, labor problems, oxygen administration, anesthetics, endocrine functions, and other topics. The college business session will be held on the second day, when Dr. Robert G. Craig, San Francisco, will deliver his presidential address. The installation of Dr. John I. Brewer, professor of obstetrics and gynecology, Northwestern University Medical School, Chicago, as president will take place on the final day. For information write Mr. Donald F. Richardson, Executive Secretary, The American College of Obstetricians and Gynecologists, P. O. Box 749, Chicago 90.

Fellowships for Research in South-East Asia.—The South-East Asia Treaty Organization has announced a Research Fellowship Program for 1959-60 "to encourage the study and research of such social, economic, political, cultural, scientific, and educational problems as give insight into the present needs and future development of the Treaty area, viewed against a background of SEATO objectives." Fellowships are offered to candidates from member states (Australia, France, New Zealand, Pakistan, the Philippines, Thailand, the United Kingdom, and the United States). A candidate must be a national of a member state and should plan to undertake his research in SEATO countries situated within the Treaty area (the general area of South-East Asia, including also the entire territories of the Asian Parties, and the general area of the South-West Pacific, not including the Pacific area north of 21°30′ north latitude). The applicant's project should be of interest to SEATO and, preferably, to two or more member countries. Candidates will be selected on the basis of their special aptitude and experience for carrying through a major project of research. Academic qualifications (preferably the doctoral degree or its equivalent), professional experience beyond the completion of training, and published material will be taken into account. Preliminary screening of American candidates will be by the Committee on International Exchange of Persons of the Conference Board of Associated Research Councils, which will recommend candidates to the Department of State and the President's Board of Foreign Scholarships. Final selection of candidates will be announced in August. It is expected that only one or two grants will be available to candidates from the United States. The grant will provide a monthly allowance of $400 and tourist-class return air travel to the country or countries of research. Grants may be authorized for periods of from 4 to 10 months. For application forms and information write: Conference Board of Associated Research Councils, Committee on International Exchange of Persons, 2101 Constitution Ave., Washington 25, D. C. Applications should be submitted no later than April 15.

CANADA

Establish Council on Hospital Accreditation.—Dr. A. Lawrence Chute, chief of pediatrics, Hospital for Sick Children, Toronto, has been appointed chairman of the newly formed Canadian Council on Hospital Accreditation. The appointment coincided with the inauguration of the first all-Canadian program designed to improve and develop the standard of hospital care in Canada. The program officially came into being at a special ceremony in the Board Room of The Canadian Medical Association, Toronto, Jan. 17. Dr. John I. Brewer, Chicago, chairman of the Joint Commission on the Accreditation of Hospitals handed over the responsibility of approving Canadian hospitals to the new council. Previously, Canadian hospitals were accredited by the Joint Commission. Dr. William I. Taylor, executive director of the Canadian Council on Hospital Accreditation, stated that the function of the program was to survey hospitals at their request, to ensure the welfare and safety of the patient. He mentioned that every aspect of hospital administration and operation would be looked into by the physician-surveyor. If the survey report met the approval of the Council, the hospital concerned would be certified as an accredited hospital. If a hospital received an unfavorable report, certain recommendations would be made but there was no obligation on the hospital's part to implement them. The immediate past-chairman of the council is Dr. E. Thibault, of Montreal. The new chairman will be supported by a board of 11 other representatives from the following associations: The Canadian Hospital Association, The Canadian Medical Association, The Royal College of Physicians and Surgeons of Canada, and L'Association des Medecins de Langue Francaise du Canada. Dr. Taylor said that action to initiate an all-Canadian program took place at the 1950 annual meeting of The Canadian Medical Association, when a committee within the C. M. A. was organized and liaison began with the associations previously mentioned. Of about 700 hospitals in Canada, some 43% reportedly have been accredited. As all accredited hospitals are resurveyed every three years, it is expected that about 130 will be inspected this year, which will include the initial surveys.

FOREIGN

Istanbul University Received Rehabilitation Bookshelf.—On Nov. 20, in Istanbul, Turkey, the first rehabilitation bookshelf of American rehabilitation

literature reportedly given to the rehabilitation library of another nation was presented to the Medical College of Istanbul University. Mr. Willis C. Gorthy, director of the Institute for the Crippled and Disabled, made the presentation on behalf of the International Society for the Welfare of Cripples and the People to People Program's Committee for the Handicapped. The committee is headed by Maj. Gen. Melvin J. Maas, who also heads the President's Committee on Employment of the Physically Handicapped. The international society and the people to people group collaborated in assembling and providing the 43-volume bookshelf. Mr. Gorthy, in Istanbul as head of a United Nations' mission on rehabilitation to the government of Turkey, presented two token books from the bookshelf to Dr. Uveys Maskar, acting dean of the university's Medical College. The balance of the bookshelf followed by special shipment.

CORRECTION

Saddle Block Anesthesia.—In the article by Dodge et al. entitled "Late Sequelae of Saddle Block Anesthesia in Obstetrics" in the Jan. 31, 1959, issue of THE JOURNAL, pages 429-432, the opening statement of the next to last paragraph on page 430 should have read "Saddle block anesthesia . . . was employed 13,299 times in this hospital since 1946." The period of observation here referred to was 1946 to 1957. The opening sentence of the next paragraph should have read "The records of 3,147 patients, given saddle block anesthesia during the six years of our study, were reviewed."

EXAMINATIONS AND LICENSURE

NATIONAL BOARD OF MEDICAL EXAMINERS

National Board of Medical Examiners: Part II only, April 21-22; Parts I and II, June 16-17; Part I only, Sept. 9-10. Examinations must be received at least six weeks in advance of a specific examination date. Examining centers established after close of registraion. Exec. Sec., Dr. John P. Hubbard, 133 South 36th St., Philadelphia 4.

EDUCATIONAL COUNCIL FOR FOREIGN MEDICAL GRADUATES, INC.

Educational Council for Foreign Medical Graduates, Inc.: Stations around the world, Feb. 17. Deadline for foreign applications was Nov. 17. The following examination will be held Sept. 22 with application deadline of June 22. Exec. Director, Dr. Dean F. Smiley, 1710 Orrington Ave., Evanston, Ill.

BOARDS OF MEDICAL EXAMINERS

ALABAMA: *Written.* Montgomery, June 16-18. Sec., Dr. D. G. Gill, State Office Bldg., Montgomery 4.

ALASKA:* On application in Anchorage and Juneau. Sec., Dr. W. M. Whitehead, 172 South Franklin St., Juneau.

ARKANSAS:* *Examination and Reciprocity.* Little Rock, June 11-12. Sec., Dr. Joe Verser, Harrisburg.

CALIFORNIA: *Written.* Los Angeles, Mar. 2-5. Sec., Mr. Wallace D. Thompson, Room 536, 1020 N. Street, Sacramento.

CONNECTICUT:* *Regular. Examination.* Hartford, March 10-12. Acting Sec., Dr. Louis P. Hastings, 160 St. Ronan St., New Haven.

FLORIDA:* *Examination.* Miami Beach, June 22-24. Sec., Dr. Homer L. Pearson, 901 N.W. 17th St., Miami 36.

GEORGIA: *Examination and Reciprocity.* Atlanta, June. Sec., Mr. C. L. Clifton, 224 State Capitol, Atlanta 3.

GUAM: *Subject to Call.* Act. Sec., Dr. F. L. Conklin, Agana.

MAINE: *Examination.* Portland, March 10-12. *Endorsement.* Portland, March 10. Sec., Dr. Adam P. Leighton, 142 High St., Portland.

MICHIGAN:* *Examination.* Ann Arbor and Detroit, June 8-10. Sec., Dr. E. C. Swanson, 118 Stevens T. Mason Bldg., West Michigan Ave., Lansing 8.

MINNESOTA:* *Reciprocity.* St. Paul, February. Sec., Dr. F. H. Magney, 230 Lowry Medical Arts Bldg., St. Paul.

MONTANA: *Examination and Reciprocity.* Helena, April 7. Sec., Dr. Thomas L. Hawkins, 555 Fuller Ave., Helena.

NEBRASKA:* *Examination.* Omaha, June. Director, Mr. Husted K. Watson, Room 1009, State Capitol Bldg., Lincoln 9.

NEW HAMPSHIRE: *Examination and Endorsement.* Concord, Mar. 11-14. Sec., Dr. Edw. W. Colby, 61 So. State St., Concord.

NEW MEXICO:* *Examination and Reciprocity.* Sante Fe, May 18-19. Sec., Dr. R. C. Derbyshire, 227 East Palace Ave., Santa Fe.

NORTH CAROLINA: *Examination.* June Asst. Sec., Mrs. Louise J. McNeill, 716 Professional Bldg., Raleigh.

OKLAHOMA:* *Examination.* Oklahoma City, June 2-3. Exec. Sec., Mrs. E. L. Haidek, 813 Braniff Bldg., Oklahoma City.

OREGON:* *Written.* Portland, Apr. 17-19. Ex. Sec., Mr. Howard I. Bobbitt, 609 Failing Bldg., Portland 4.

PUERTO RICO: *Examination and Reciprocity.* San Juan, March 3. Acting Secretary, Dr. Herminio Mendez Herrera, Box 9156, Santurce.

SOUTH CAROLINA: *Reciprocity.* Columbia, May 12; *Examination.* Columbia, June 23-24. Sec., Dr. H. E. Jervey, Jr., 1829 Blanding St., Columbia.

TEXAS:* *Examination and Reciprocity.* Fort Worth, June 22-24. Sec., Dr. M. H. Crabb, 1714 Medical Arts Bldg., Fort Worth 2.

UTAH: *Examination.* Salt Lake City, July 8-10. Dir., Mr. Frank E. Lees, 324 State Capitol Bldg., Salt Lake City 1.

BOARDS OF EXAMINERS IN THE BASIC SCIENCES

ARKANSAS: *Examination.* Little Rock, May 4-5. Sec., Dr. S. C. Dellinger, University of Arkansas, Fayetteville.

FLORIDA: *Examination.* Miami, June 6. Sec., Mr. M. W. Emmel, University of Florida, Box 340, Gainesville.

KANSAS: *Examination.* Kansas City, June. Sec., Dr. L. C. Heckert, Pittsburg.

OKLAHOMA: *Examination.* Oklahoma City, Mar. 27-28. Exec. Sec., Mrs. L. Haidek, 813 Braniff Bldg., Oklahoma City.

OREGON: *Written.* Mar. 7. Sec., Dr. Earl M. Pallett, Box 5175, Eugene.

RHODE ISLAND: *Examination.* Providence, Feb. 18. Administrator of Professional Regulation, Mr. Thomas B. Casey, 366 State Office Bldg., Providence.

TEXAS: *Examination.* Austin, Galveston, Houston, Apr. 17-18. Certificates issued by reciprocity and waiver on the first and fifteenth of each month. Sec., Bro. Raphael Wilson, 407 Perry-Brooks Bldg., Austin.

WISCONSIN: *Examination.* Madison, April 4. Final date for filing application is March 27. Milwaukee, June 6. Final date for final application is May 29. Sec., Mr. W. H. Barber, 621 Ransom St., Ripon.

*Basic Science Certificate required.

GOVERNMENT SERVICES

AIR FORCE

Award for Dr. Strughold.—Dr. Hubertus Strughold, advisor for research and professor of space medicine at the Air Force School of Aviation Medicine, was given the Dr. John J. Jeffries award, in January, for his research in space and aviation medicine. The award is presented annually by the Institute of the Aeronautical Sciences. Often called "the father of space medicine," Dr. Strughold was the first scientist to define specific areas to be investigated in space medicine, the first to give a comprehensive definition of space and space equivalency, and was the first chief of the School of Aviation Medicine's Department (now Division) of Space Medicine.

New Hospital.—The new U. S. Air Force Hospital at Larson Air Force Base, Wash., was formally dedicated on Dec. 13, 1958. This 50-bed, air-conditioned hospital has an audiovisual nurse call

New Air Force Hospital at Larson Air Force Base, Wash.

system, centralized oxygen and vacuum system, public address and program distribution system, and a centralized food service system. Specialty services include pediatrics, obstetrics and gynecology, general surgery, and internal medicine. Lieut. Col. John R. Troxell, M. C., is commander of the hospital.

NAVY

Lieutenant Novosad Awarded Legion of Merit.—Lieut. Charles L. Novosad Jr., M. C., U. S. N. R. (inactive), was awarded the Legion of Merit by the President of the United States for outstanding services. On July 12, 1957, when a helicopter crashed and burned on the ice near the base at McMurdo Sound, Antarctica, resulting in the instant death of one man and critical injuries to two others, Lieutenant Novosad was directly responsible for saving the lives of the two seriously injured men. He is now practicing medicine at the Headlee Clinic, Odessa, Texas.

VETERANS ADMINISTRATION

Hospital Entertainment Program.—An advisory group of top figures in the entertainment world will help Veterans Administration hospitals make best use of radio and television as beneficial activities for veteran patients. The advisors will work through the Veterans Hospital Radio and Television Guild, a voluntary organization with headquarters in New York City, which for years has been encouraging hospitalized veterans to try their hand at radio-television writing, acting, and production. The Guild sends its members—professionals in radio and television—into VA hospitals to teach veterans all the elements of radio-television. It also sends VA hospitals a monthly supply of professional radio and television scripts, to be produced and acted by patients for the enjoyment of their fellow-patients. The purpose is not to make professionals of veteran patients. Instead, working closely with the VA hospital recreation staff, the Guild attempts to provide patients with a worthwhile activity while they spend long days and weeks in the hospital.

FOOD AND DRUG ADMINISTRATION

Personal.—Dr. Oral L. Kline was made head of the Division of Nutrition, Dr. Henry Fischbach of the Division of Food, and Dr. Leo Friedman was designated Director of Research for the Division of Nutrition. Dr. Kline succeeded Dr. E. M. Nelson, who died in December, and Dr. Fischbach succeeded Dr. Kline.

PUBLIC HEALTH SERVICE

Influenza Vaccine for Cardiac Patients.—Drs. Leroy Burney, surgeon general of the Public Health Service, and Francis L. Chamberlain, president of the American Heart Association, believe that patients with heart or lung diseases are more susceptible to the hazards of influenza than is the general population. This increased risk is shown by more severe illness and by higher case fatality rates among patients with these diseases. Patients with, or prone to, pulmonary congestion secondary to heart disease are an especially high risk group. Studies with influenza vaccine have shown that its use significantly reduces the incidence and probably the severity of influenza infection in the presence of local or widespread epidemics. Furthermore, use of the vaccine is contraindicated only in patients who are allergic to the components of the vaccine. The type of local and systemic reactions to vaccine have not been such as to constitute any significant hazard to patients with cardiac disease. Persons with cardiovascular disease are urged to consult their physicians as to the advisability of obtaining influenza vaccination.

DEATHS

Abeken, Frederick Gustavus Ⓜ Comdr., U. S. Navy, retired, St. Louis; Washington University School of Medicine, St. Louis, 1899; service member of the American Medical Association; fellow of the American College of Surgeons; entered the U. S. Navy in 1903 and retired Aug. 1, 1933; died in the U. S. Naval Hospital, Oakland, Calif., Sept. 23, aged 80.

Acree, Walter Enis, Huntsville, Ark. (licensed in Arkansas in 1907); served as president of the Madison County Medical Society; on the staff of the Fayetteville City Hospital, where he died Nov. 5, aged 80.

Baker, Max, Rumford, R. I.; Boston University School of Medicine, 1923; died Nov. 25, aged 62.

Barnhart, Jessie May Lockwood, Portland, Ore.; Keokuk (Iowa) Medical College, College of Physicians and Surgeons, 1908; died in the Emanuel Hospital June 29, aged 85.

Baylis, Henry Eugene, Kerrville, Texas; Medical Department of Tulane University of Louisiana, New Orleans, 1893; veteran of World War I; died Nov. 29, aged 91.

Bell, Lachlan J., Detroit; Michigan College of Medicine and Surgery, Detroit, 1896; died in the Wayne County General Hospital Sept. 25, aged 83.

Binford, William Sherwood Ⓜ Davenport, Iowa; State University of Iowa College of Medicine, Iowa City, 1900; past-president of the Scott County Medical Society; presented a 50-year medallion by the Iowa State Medical Society; veteran of World War I; on the staff of St. Luke's Hospital; died Dec. 1, aged 83.

Binkley, Roy Spitler Ⓜ Dayton, Ohio; Starling–Ohio Medical College, Columbus, 1911; past-president of the Montgomery County Medical Society; member of the American Academy of Ophthalmology and Otolaryngology; associated with Barney Convalescent Hospital, St. Elizabeth Hospital, where he was formerly chief of staff, and the Good Samaritan Hospital, where he died Nov. 26, aged 75.

Black, James Harvey Ⓜ Dallas, Texas; born in Huntington, W. Va., March 27, 1884; Southwestern University Medical College, Dallas, Texas, 1907; consultant in internal medicine at the Southwestern Medical School of the University of Texas, where he was professor of clinical medicine for many years; served on the faculty and in 1914-1915 dean at Southern Methodist University Medical Department; formerly on the faculty at Baylor University College of Medicine; chairman, Section on Pathology and Physiology, American Medical Association, 1931-1932; past-president and secretary of the American Association for the Study of Allergy; past-president of the Texas Allergy Association and the Texas Pathological Society; past-president of the American Society of Clinical Pathologists; member of the American Academy of Allergy and was the first recipient of a prize for his paper read at its first meeting on Dec. 11, 1944; fellow of the American College of Physicians and the American Public Health Association; specialist certified by the American Board of Internal Medicine; consultant, Parkland Memorial Hospital and the Children's Medical Center; formerly on the editorial board, and an editor of the allergy and biological abstracts section, *Journal of Allergy;* revised "Practice of Allergy" and "Primer of Allergy"; died Nov. 30, aged 74.

Bornscheuer, Albert Adam, Pittsburgh; Johns Hopkins University School of Medicine, Baltimore, 1913; an associate member of the American Medical Association; member of the American Society of Plastic and Reconstructive Surgery; fellow of the American College of Surgeons; on the staff of St. Francis Hospital; died Nov. 22, aged 70.

Braswell, Leon Melvin, Lynchburg, Va.; Meharry Medical College, Nashville, Tenn., 1936; died Nov. 6, aged 54.

Braunstein, William, Long Island City, N. Y.; Masarykova Universita Fakulta Lékařská, Brno, Czechoslovakia, 1928; an associate member of the American Medical Association; veteran of World War II; died in the Veterans Administration Hospital in New York City Nov. 30, aged 63.

Broudo, Philip Harmon Ⓜ Detroit; University of Illinois College of Medicine, Chicago, 1915; member of the Radiological Society of North America; died Nov. 23, aged 71.

Buffett, Claude, Honolulu, Hawaii; McGill University Faculty of Medicine, Montreal, Que., Canada, 1900; an associate member of the American Medical Association; died in the Queen's Hospital Nov. 1, aged 84.

Butterfield, George Kittredge Ⓜ Merrimack, N. H.; Tufts College Medical School, Boston, 1903; at one time on the faculty of Albany (N. Y.) Medical College; specialist certified by the American Board of

Ⓜ Indicates Member of the American Medical Association.

Psychiatry and Neurology; member of the American Psychiatric Association; formerly assistant superintendent of Butler State Hospital in Providence, R. I.; and medical superintendent of the Marshall Sanitarium in Troy, N. Y.; died in the Memorial Hospital, Nashua, Sept. 8, aged 77.

Claverie, Eugene Hypolite Jr. Ⓜ New Orleans; Louisiana State University Medical Center, New Orleans, 1938; member of the American Academy of General Practice; also a graduate in pharmacy; died in the Montelepre Memorial Hospital Nov. 23, aged 53.

Coelho, Thome Emilio Pires Ⓜ Fall River, Mass.; Universidade de Lisboa Faculdade de Medicina, Portugal, 1915; died Nov. 22, aged 68.

Coleman, James A. Ⓜ Toledo, Ohio; Toledo Medical College, 1898; died in St. Vincent's Hospital Sept. 20, aged 91.

Craig, John Percy Ⓜ Chester, Pa.; Hahnemann Medical College and Hospital of Philadelphia, 1909; a courtesy member of the staff of Chester Hospital; served on the staffs of the Hahnemann Hospital and the J. Lewis Crozer Hospital, where he was eye, ear, nose and throat chief until 1957, and where he died Nov. 22, aged 75.

Creighton, William James, Philadelphia; University of Pennsylvania Department of Medicine, Philadelphia, 1904; an associate member of the American Medical Association; member of the American Academy of Ophthalmology and Otolaryngology; veteran of World War I; member of the staffs of the Germantown and Wills Eye hospitals; on the staff of the Lankenau Hospital, where he died Sept. 21, aged 76.

Cremens, John Francis Ⓜ Paterson, N. J.; University of Georgia Medical Department, Augusta, 1916; died in the Valley Hospital, Ridgewood, Nov. 13, aged 70.

Cunningham, Isaac W. Ⓜ Richlands, Va.; Medical College of Virginia, Richmond, 1909; on the staff of the Mattie Williams Hospital; died Nov. 26, aged 80.

Davis, Ralph Allison Ⓜ Chicago; Northwestern University Medical School, Chicago, 1925; specialist certified by the American Board of Ophthalmology; member of the American Academy of Ophthalmology and Otolaryngology; assistant professor of ophthalmology at Northwestern University Medical School; on the staffs of the Swedish Covenant Hospital and the Chicago Wesley Memorial Hospital, where he died Dec. 10, aged 59.

Deason, Giles Arthur Ⓜ Shreveport, La.; Baylor University College of Medicine, Dallas, 1914; service member of the American Medical Association; veteran of World War I; for many years associated with the Veterans Administration; served on the staff of the Veterans Administration Center, where he died Nov. 25, aged 70.

Delaney, William Joseph Ⓜ Marlboro, Mass.; College of Physicians and Surgeons, Boston, 1918; for many years on the staff of the Marlborough Hospital; died in Brattleboro, Vt., Nov. 25, aged 63.

DeRiemer, Robert Posey Ⓜ Spokane, Wash.; University of Pennsylvania School of Medicine, Philadelphia, 1927; served overseas during World War I; for many years associated with the Deaconess Hospital, where he served as both president and secretary of the medical staff; died Nov. 19, aged 61.

Diamand, Morris, Worcester, Mass.; Medizinische Fakultät der Universität, Vienna, Austria, 1920; member of the Massachusetts Medical Society; for many years county physician; served on the staffs of Henry Heywood Memorial Hospital in Gardner and the Athol Memorial Hospital in Athol; died in the Worcester City Hospital Sept. 7, aged 66.

Dickson, Ellsworth Joseph Murray Ⓜ Needham, Mass.; Tufts College Medical School, Boston, 1912; formerly a medical missionary in China; associated with the Newton–Wellesley Hospital in Newton and the Glover Memorial Hospital in Needham; died Nov. 7, aged 75.

Elkins, Higdon Bryant Ⓜ Iowa City, Iowa; Washington University School of Medicine, St. Louis, 1930; professor of radiology at the State University of Iowa College of Medicine; specialist certified by the American Board of Radiology; member of the American Roentgen Ray Society, Radiological Society of North America, American College of Radiology, and the American Radium Society; veteran of World War II; associated with the University Hospitals; died Nov. 29, aged 51.

Emch, Minna Elizabeth Libman Ⓜ Chicago; born in Vilna, Russia, Aug. 10, 1904; University of Illinois College of Medicine, Chicago, 1929; specialist certified by the American Board of Psychiatry and Neurology; served on the faculty of Loyola University School of Medicine and Northwestern University Medical School; member of the American Psychoanalytic Association, American Psychiatric Association, American Association for the Advancement of Science, Sigma Xi, and Phi Beta Kappa; a member of the board of the Illinois Society for Mental Health and chairman of the committee on membership and education of the Chicago Psychoanalytic Society; supervising analyst at the Chicago Institute of Psychoanalysis; a consultant to the Elgin (Ill.) State Hospital; served as senior physician in charge of the women's psychiatric service at the Worcester (Mass.) State Hospital; died Sept. 28, aged 54.

Emmens, Thomas Holmes Ⓜ Medford, Ore.; University of Oregon Medical School, Portland, 1939; specialist certified by the American Board of

Ophthalmology; member of the American Academy of Ophthalmology and Otolaryngology; veteran of World War II; on the staffs of the Sacred Heart and Community hospitals; died in Eugene Nov. 8, aged 46.

Farley, Linwood, Williamsburg, Va.; Medical College of Virginia, Richmond, 1928; member of the Medical Society of Virginia, and the American Public Health Association; director of public health for the counties of Charles City, York, James City, New Kent, and the city of Williamsburg; served as president of the Williamsburg–James City County Medical Society; formerly health officer of Hanover County; died Nov. 18, aged 58.

Flory, Orville H., St. Edward, Neb.; Kansas City (Mo.) Medical College, 1891; president of the First National Bank of St. Edward; died in the Boone County Community Hospital, Albion, Nov. 3, aged 89.

Foote, Frederick Sanford Ⓜ San Francisco; University of California School of Medicine, San Francisco, 1925; assistant clinical professor of surgery at his alma mater; specialist certified by the American Board of Surgery; fellow of the American College of Surgeons; veteran of World War II; associated with the University of California and Franklin hospitals; died Nov. 9, aged 61.

Fosque, George Lee Ⓜ Onancock, Va.; Jefferson Medical College of Philadelphia, 1901; died Nov. 29, aged 81.

Fox, Maurice Simpson Ⓜ Vincennes, Ind.; Indiana University School of Medicine, Indianapolis, 1930; member of the American College of Allergists; veteran of World War II; on the staff of the Good Samaritan Hospital, where he died Nov. 21, aged 57.

Freeman, Floyd Milford Ⓜ Goshen, Ind.; University of Michigan Department of Medicine and Surgery, Ann Arbor, 1908; past-president of the Elkhart County Medical Society; died in the Goshen General Hospital Nov. 25, aged 75.

Gans, Edward Mathias Ⓜ Harlowton, Mont.; University of Minnesota College of Medicine and Surgery, Minneapolis, 1905; past-president the Medical Association of Montana and the Fergus County Medical Society; named general practitioner of the year by the American Medical Association in 1956; named the nation's outstanding Catholic doctor; Veteran of World War I; died in the Wheatland Memorial Hospital Nov. 30, aged 82.

Garton, Avery M. Ⓜ Chanute, Kan.; University of Kansas School of Medicine, Kansas City, 1908; on the staff of the Neosho Memorial Hospital; died Nov. 27, aged 74.

Gay, Charles Francis Ⓜ Brockport, N. Y.; University of Rochester School of Medicine and Dentistry, Rochester, N. Y., 1936; member of the American Academy of General Practice; veteran of World War II; formerly member of the board of education; associated with the Lakeside Memorial Hospital, where he died Nov. 9, aged 47.

Gorlin, David Oscar, Ozone Park, N. Y.; George Washington University School of Medicine, Washington, D. C., 1928; member of the Medical Society of the State of New York and the American College of Chest Physicians; veteran of World War II; died Nov. 11, aged 55.

Haley, Lewis Clay Ⓜ Axton, Va.; Medical College of Virginia, Richmond, 1910; on the staff of the Martinsville (Va.) General Hospital; died Nov. 17, aged 89.

Hampton, George Robert, Orange, Conn.; Georgetown University School of Medicine, Washington, D. C., 1909; member of the Medical Society of New Jersey; an associate member of the American Medical Association; for many years on the staff of the New Jersey State Hospital in Greystone Park; died Nov. 30, aged 80.

Handis, George Alexander, Bakersfield, Calif.; Flint Medical College of New Orleans University, New Orleans, 1909; decorated by the late President Roosevelt for his services during World War II; died Nov. 17, aged 77.

Henning, Carl Ⓜ Hanover, Ind.; Indiana Medical College, School of Medicine of Purdue University, Indianapolis, 1906; veteran of World War I; served as county coroner, county health officer and county physician; died in the King's Daughters' Hospital, Madison, Nov. 24, aged 79.

Herzer, Henry Albert Ⓜ Albion, Mich.; University of Michigan Department of Medicine and Surgery, Ann Arbor, 1902; died in Alma Nov. 28, aged 89.

Hill, Courtney Hamilton Ⓜ Monroe, La.; Chicago College of Medicine and Surgery, 1912; on the staff of St. Francis Hospital; died in the Ochsner Foundation Hospital in New Orleans Nov. 29, aged 74.

Hoff, Louis Latzer, Holyoke, Mass.; Baltimore Medical College, 1907; died in Holyoke Hospital Nov. 28, aged 73.

Holden, Richard James, Baker, Mont.; University of Toronto Faculty of Medicine, Toronto, Ontario, Canada, 1945; died Oct. 4, aged 37.

Huggard, Leslie Herbert Ⓜ Limestone, Maine; University of Vermont College of Medicine, Burlington, 1905; died in the Cary Memorial Hospital in Caribou Nov. 22, aged 84.

Jackson, Elbert William Ⓜ Paducah, Ky.; University of Louisville (Ky.) Medical Department, 1912; member of the Southeastern Surgical Congress; fellow of the American College of Surgeons; veteran

of World War I; past-president and vice-president of the Kentucky State Medical Association; past-president of the Kentucky Surgical Society; for many years member of the county board of health; served on the staffs of the Riverside, Illinois Central, and Western Baptist hospitals; died Nov. 28, aged 71.

Johnson, Margaret Lee, Boulder, Colo.; University of Colorado School of Medicine, Denver, 1908; at one time director of physical education for women, University of Colorado; associated with the Boulder–Colorado Sanitarium and Hospital and the Community Hospital, where she died Nov. 9, aged 83.

Joyner, Powell Winfred Ⓜ Enfield, N. C.; Syracuse University College of Medicine, 1932; member of the American Academy of General Practice; past-president of the Halifax County Medical Society; died in Rocky Mount Nov. 29, aged 51.

Kanai, Matsukichi, Albuquerque, N. M.; Rush Medical College, Chicago, 1936; certified by the National Board of Medical Examiners; died Nov. 22, aged 53.

Lakner, Edward William Ⓜ Cleveland; University of Michigan Medical School, Ann Arbor, 1930; fellow of the American College of Surgeons; member of the staffs of St. Luke's, St. Ann's, and St. Alexis hospitals; died in the Cleveland Clinic Hospital Nov. 18, aged 55.

Lanier, Lucien Herbert Ⓜ Texarkana, Ark.; Barnes Medical College, St. Louis, 1904; veteran of World War I; member of the staff of the Michael Meagher Memorial Hospital, where he served as secretary and chief of staff for two terms each; died in St. Michael's Hospital Nov. 21, aged 78.

Lawley, Brace Irving Ⓜ Arlington, Mass.; Tufts College Medical School, Boston, 1910; on the staff of the Symmes Arlington Hospital; died Nov. 30, aged 79.

Littlepage, Thomas Mellen Ⓜ Butler, Ala.; Medical College of Alabama, Mobile, 1904; for many years county health officer; died in the Anderson Infirmary, Meridian, Miss., Nov. 22, aged 79.

Loewenberg, Samuel Aaron Ⓜ Philadelphia; Medico-Chirurgical College of Philadelphia, 1903; clinical professor of medicine at Jefferson Medical College; formerly on the faculty of his alma mater; specialist certified by the American Board of Internal Medicine; member of the Endocrine Society; fellow of the American College of Physicians; on the staffs of Northern and Southern Divisions of the Einstein Medical Center, and the Philadelphia General Hospital; died Dec. 4, aged 77.

Loveless, James Clark Ⓜ Lamesa, Texas; University of Texas School of Medicine, Galveston, 1906; served on the draft board during World War II; died in the Lamesa General Hospital Nov. 29, aged 80.

Lundquist, Carl William, Swea City, Iowa; Keokuk (Ia.) Medical College, College of Physicians and Surgeons, 1907; died in Estherville Nov. 10, aged 84.

McCoy, Thomas Cresap Ⓜ Waterville, Maine; Columbia University College of Physicians and Surgeons, New York City, 1905; formerly practiced in New York City; past-president of the Kennebec County Medical Society; veteran of World War I; in 1944 appointed an examiner for the Civil Aeronautics Administration and in 1949 was named an airline examiner; associated with the Sisters' Hospital; died in the Veterans Administration Center in Togus Nov. 9, aged 73.

McCracken, George K., Ossining, N. Y.; Queen's University Faculty of Medicine, Kingston, Ont., Canada, 1926; for many years associated with Sing Sing Prison; died Dec. 5, aged 59.

McDonald, Robert Francis, Brooklyn; Cornell University Medical College, New York City, 1901; an associate member of the American Medical Association; for many years on the staff of St. Mary's Hospital, where he died Nov. 21, aged 78.

McKirahan, Josiah Ralph, Des Moines, Iowa; Rush Medical College, Chicago, 1902; at one time secretary-treasurer of the Kearney County (Neb.) Medical Society; veteran of World War I; died in Dunedin, Fla., Nov. 6, aged 80.

McNamara, John Gerard Ⓜ Brooklyn; born in Brooklyn, Dec. 25, 1894; Long Island College Hospital, Brooklyn, 1921; specialist certified by the American Board of Orthopaedic Surgery; member of the American Academy of Orthopaedic Surgeons; fellow of the American College of Surgeons; clinical assistant professor of orthopedic surgery, State University of New York College of Medicine, Brooklyn; last June was honored as "Doctor of the Year" by the Bay Ridge Medical Association, of which he was past-president; past-president of the Catholic Physicians' Guild of the Diocese of Brooklyn and of the Celtic Medical Association of New York; associated with Victory Memorial Hospital, Lutheran Medical Center, St. Charles Hospital, and the Long Island College Hospital, where he died Dec. 2, aged 63.

Maher, John Matthew Ⓜ Stratford, Conn.; Boston University School of Medicine, 1927; formerly on the faculty of Yale University School of Medicine in New Haven; served on the staffs of the Hospital for Joint Diseases in New York City and the Bridgeport (Conn.) Hospital, where he died Nov. 24, aged 60.

Marcus, Ida Irma, Chicago; Deutsche Universität Medizinische Fakultät, Prague, Czechoslovakia, 1920; on the staff of the American Hospital; died in the Louis A. Weiss Memorial Hospital Dec. 3, aged 64.

Maresh, George, Denver; State University of Iowa College of Medicine, Iowa City, 1902; veteran of World War I; served with the Veterans Administration in Portland, Ore., Boise, Idaho, Ogden, Utah, and Denver; died in Mercy Hospital Nov. 20, aged 78.

Maxwell, William Clark, Pittsburgh; University of Pittsburgh School of Medicine, 1902; an associate member of the American Medical Association; on the staff of the Columbia Hospital in Wilkinsburg, Pa.; died Nov. 28, aged 83.

Meany, Daniel Edward, Chicago; College of Physicians and Surgeons of Chicago, School of Medicine of the University of Illinois, 1910; for many years associated with St. Bernard's Hospital; died Dec. 6, aged 72.

Motter, Thomas Ira Ⓜ Oak Park, Ill.; Chicago Homeopathic Medical College, 1897; Rush Medical College, Chicago, 1899; associated with West Suburban Hospital, where he was a trustee; died Nov. 20, aged 86.

Muir, Mark Devlin Ⓜ Captain, U. S. Army, San Rafael, Calif.; Creighton University School of Medicine, Omaha, 1955; service member of the American Medical Association; interned at St. Mark's Hospital in Salt Lake City; resident in psychiatry at the Letterman Army Hospital in San Francisco; died Nov. 22, aged 31.

Nelson, Clyde Vincent, Los Angeles; College of Physicians and Surgeons, medical department of the University of Southern California, Los Angeles, 1914; served on the staffs of the California Lutheran and Queen of Angels hospitals; died Nov. 21, aged 74.

Parsche, Thomas William Ⓜ Ocean Springs, Miss.; Rush Medical College, Chicago, 1903; formerly practiced in Chicago, where he was associated with Henrotin, St. Joseph, and Edgewater hospitals; member of the Illinois State Medical Society; died in Gulfport Dec. 9, aged 77.

Pease, George Norman Ⓜ La Jolla, Calif.; Cornell University Medical College, New York City, 1907; member of the founders group of the American Board of Surgery; formerly on the faculty of the University of Oregon Medical School in Portland; member of the Oregon State Medical Society; fellow of the American College of Surgeons; veteran of World War I; served on the staff of the Hoag Memorial Hospital in Newport Beach; formerly on the staffs of University of Oregon Medical Hospital, Good Samaritan, and St. Vincents hospitals in Portland; died in Bend, Ore., Nov. 15, aged 76.

Perdue, Thomas Rugely, Castro Valley, Calif.; University of Kansas School of Medicine, Kansas City, Kan., 1947; assistant health officer of Alameda County; formerly health officer of Parsons, Kan., and Bozeman, Mont.; served on the staff of the Highland–Alameda County Hospital in Oakland; died Nov. 21, aged 34.

Pissoort, Elizabeth Petronville, New York City; Université Libre de Bruxelles Faculté de Médecine, Belgium, 1923; died in Malaga, Spain, Nov. 20, aged 68.

Rawles, Benjamin Watkins Ⓜ Richmond, Va.; Medical College of Virginia, Richmond, 1897; died Nov. 26, aged 88.

Reekie, Richard Douty Ⓜ Spokane, Wash.; born in Seattle Dec. 2, 1900; University of Michigan Medical School, Ann Arbor, 1933; specialist certified by the American Board of Obstetrics and Gynecology; fellow of the American College of Surgeons; past-president of the Spokane County Medical Society and the Spokane Surgical Society; past-president and vice-president of the Pacific Northwest Obstetrical and Gynecological Society; veteran of World War II; consultant in obstetrics and gynecology at the University of Washington School of Medicine in Seattle; associated with Salvation Army Booth Memorial Hospital, Deaconess Hospital, Sacred Heart Hospital, and St. Luke's Hospital; consultant, Veterans Administration; died Nov. 23, aged 57.

Richards, Paul Snelgrove Ⓜ Salt Lake City; born in Salt Lake City Nov. 25, 1892; Harvard Medical School, Boston, 1920; interned at the Cincinnati General Hospital; received residency training at Boston Free Hospital for Women and Boston Lying-In Hospital; served on the faculty of the University of Utah College of Medicine; specialist certified by the American Board of Preventive Medicine and Occupational Medicine; fellow of the American College of Surgeons; member of the Council on Industrial Health of the American Medical Association; member of the Industrial Medical Association and the American Industrial Hygienists' Association; consultant to the U. S. Public Health Service; served 16 years as a member and 10 years as president of the Jordan District Board of Education; instrumental in the building of the Bingham High School in Copperton; a member of the committee named by the Utah State Industrial Commission in 1939 to study occupational disease laws; along with Dr. Louis E. Viko, in 1953 received a presidential citation for outstanding service to the physically handicapped; member of the Bingham District Boy Scout Council and held the Silver Beaver Award; first president of the Bingham Lions Club; for 27 years practiced in Bingham Canyon, where he established his own clinic and 35-bed

hospital; co-founder of the Richards Memorial Medical Foundation, established in November, 1958; for five years served as chairman of its executive committee, and medical consultant at the Memorial Medical Center, where he died Nov. 20, aged 65.

Riley, Benjamin Franklin Jr. Ⓜ Thomson, Ga.; Johns Hopkins University School of Medicine, Baltimore, 1903; died Nov. 11, aged 79.

Riordan, Emmett Joseph Ⓜ Portsmouth, Ohio; University of Kansas School of Medicine, Kansas City, Kan., 1941; veteran of World War II; resigned from the regular Navy on Nov. 20, 1953; fellow of the American College of Surgeons; associated with Mercy and Portsmouth General hospitals; died in the Veterans Administration Hospital, Huntington, W. Va., Nov. 4, aged 43.

Roose, John Edwin Ⓜ Tiffin, Ohio; Western Reserve University School of Medicine, Cleveland, 1946; served an internship and residency at the University Hospitals in Cleveland; at one time a resident at the City Hospital in Cleveland; formerly a captain in the medical corps, Army of the United States; past-president of the Seneca County and North Central Mental Health associations; on the staff of the Mercy Hospital; died Nov. 11, aged 36.

Saunders, Irvine Ⓜ Welch, W. Va.; University of Virginia Department of Medicine, Charlottesville, 1937; served as secretary of the McDowell County Medical Society; elected as a member of the House of Delegates from McDowell County in 1952 and again in 1954; for many years superintendent of the Welch Emergency Hospital; formerly associated with the Grace Hospital; died Nov. 28, aged 45.

Scanlon, Thomas Francis Ⓜ Norwalk, Conn.; Yale University School of Medicine, New Haven, 1907; fellow of the American College of Surgeons; for many years on the staff of the Norwalk Hospital, where he died Nov. 19, aged 75.

Schwartz, Nathan, Chicago; Loyola University School of Medicine, Chicago, 1917; died in Highland Park, Ill., Nov. 12, aged 74.

Seymon, Max Andre Ⓜ Beverly Hills, Calif.; Johann Wolfgang Goethe–Universität Medizinische Fakultät, Frankfurt-am-Main, Prussia, Germany, 1921; on the staff of Cedars of Lebanon Hospital in Los Angeles, where he died Nov. 1, aged 64.

Seymour, George Alfred Ⓜ Elizabeth, N. J.; College of Physicians and Surgeons, Baltimore, 1910; past-president of the Union County Medical Society; served on the staffs of Elizabeth General, St. Elizabeth, and Alexian Brothers hospitals; died in Somerville Dec. 1, aged 71.

Smiles, Clyde Jeffrey Ⓜ Ashland, Wis.; University of Pennsylvania School of Medicine, Philadelphia, 1911; affiliated with St. Joseph's Hospital and the Trinity Hospital, where he died Nov. 19, aged 72.

Stamas, Theodore Albert Ⓜ Lowell, Mass.; Tufts College Medical School, Boston, 1920; veteran of World War I; served on the staffs of the Lowell General Hospital and St. Joseph's Hospital; died Nov. 22, aged 63.

Stewart, Frank William, Long Beach, Calif.; the Hahnemann Medical College and Hospital, Chicago, 1902; veteran of the Spanish–American War; for many years city health officer; died Nov. 9, aged 80.

Tappan, Edward Arthur Ⓜ Paxton, Ill.; University of Illinois College of Medicine, Chicago, 1936; member of the American Academy of General Practice; associated with the Gibson City (Ill.) Hospital and the Paxton Community Hospital, where he died Nov. 1, aged 57.

Taylor, Albert Richards Ⓜ Cheyenne, Wyo.; University and Bellevue Hospital Medical College, New York City, 1927; director, division of maternal child health and crippled children, Wyoming Department of Public Health; veteran of World Wars I and II; member of the American Public Health Association and the Association of State and Territorial Directors of Maternal and Child Health; died in the DePaul Hospital Nov. 9, aged 60.

Thomas, Arthur William, Ashtabula, Ohio; Ohio State University College of Medicine, Columbus, 1914; member of the Ohio State Medical Association; past-president of the Mahoning County Medical Society; served as chief of the division of child hygiene for the state department of health in Columbus; later appointed chief of the subdivision of child hygiene in the Cleveland Department of Health; died in the Ashtabula General Hospital Nov. 26, aged 69.

Treadway, W. W., Ⓜ Silex, Mo.; St. Louis College of Physicians and Surgeons, 1889; died Nov. 30, aged 92.

Uran, Joseph Alfred, Riceville, Iowa; College of Physicians and Surgeons of Chicago, School of Medicine of the University of Illinois, 1903; died in the University Hospital, Iowa City, Nov. 11, aged 81.

Winslow, John Hayes Ⓜ Vineland, N. J.; Jefferson Medical College of Philadelphia, 1901; past-president of the Vineland Board of Education; veteran of World War I; associated with the Newcomb Hospital, where he was a trustee, and where he died Nov. 15, aged 80.

Woodul, Thomas W., Pine Bluff, Ark.; College of Physicians and Surgeons, Little Rock, 1907; died in the Davis Hospital Nov. 22, aged 80.

FOREIGN LETTERS

AUSTRIA

Lymphogranuloma.—At the meeting of the Society of Physicians in Vienna on Dec. 5, Drs. G. Brichta and J. Kühböck presented the history of three patients with Hodgkin's disease. The first was a 25-year-old woman with spastic paraplegia in the presence of epidural and vertebral involvement. After laminectomy, roentgen irradiation, and treatment with nitrogen mustard, walking ability was largely restored. The second patient, a 36-year-old man, presented complications such as jaundice due to complete obstruction of the bile flow which responded promptly to nitrogen mustard derivatives and toxic hemolytic anemia which responded well to cortisone. The patient was given maintenance doses of prednisone and has since presented no new manifestations of disease. The third patient had a relapsing miliary pulmonic form of Hodgkin's disease. She reacted promptly to treatment with nitrogen mustard and prednisolone. The most practical therapy and that which gives the longest life expectancy in the treatment of the lymphogranulomatoses consists of a combination of irradiation, cystostatic agents, and cortisone derivatives.

Operations in Diabetics.—At the same meeting Dr. R. P. Königstein stated that diabetic angiopathy occurs frequently in patients in whom diabetes has been present for a long time and should be considered when an operation is contemplated. The danger of the development of thrombosis and embolism in such patients is great. The occurrence of diabetic pseudoperitonitis often results in an erroneous diagnosis of an acute intraperitoneal process in the course of a decompensated diabetic acidosis. Severe dryness of the mouth, pharynx, and larynx associated with dysphagia and hoarseness may lead to the erroneous diagnosis of an acute pharyngolaryngitis especially since the onset may be acute. Diabetic neuropathies, chronic pyoderma, and eczema (especially in the genital region) have often been treated for long periods without any relief because the causative metabolic disturbance has not been recognized. Diabetic patients with chronic diseases such as hernia, cholelithiasis, peptic ulcer, and chronic appendicitis should be operated on when they are free of symptoms and their metabolic condition is favorable.

Dr. R. M. Milczoch reported on a series of 616 diabetic patients with surgical diseases who were treated between 1943 and 1956. Of these 422 were operated on, and of this number 85% were over 50. Of those operated on 18% died, the mortality being highest in those who were operated on because of gangrene. The use of antibiotics and modern methods of anesthesia reduced the postoperative mortality from 29.6 to 14.0%. Massive hemorrhage and obstruction of breathing by occlusion of the respiratory passages or by open pneumothorax are about the only indications which require operation without considering the patient's diabetes. In other emergencies that represent an absolute indication for operation and in which one has an opportunity to carry out the most important investigations and to start an adequate therapeutic regimen for the diabetes, one must differentiate between surgical conditions that lower the glucose tolerance (septic processes, including gas gangrene, obstructive gastrointestinal lesions, and acute abdominal conditions) and those which do not appreciably affect it. Not enough emphasis has been given in the literature to cases of ileus in diabetics but they require the closest possible cooperation between internist and surgeon. The recognition of diabetic pseudoperitonitis is not difficult if it is considered in the differential diagnosis. It is much more difficult in a patient with diabetic coma. Cases of ileus are particularly apt to upset the blood sugar balance in a patient with hitherto controlled diabetes and acidosis may result. The speaker cautioned against being satisfied with a diagnosis of diabetic coma in a patient admitted to a surgical ward. An unrecognized surgical disorder might be the cause of the coma. It is essential to operate early on patients with surgical disorders that lower the glucose tolerance.

FINLAND

Congenital Malformations.—M. E. Takala (*Annales chirurgiae et gynaecologiae fenniae*, vol. 47, supp. 77, 1958) studied 241 families into which one or more congenitally malformed children had been born to determine the influence of genetic and environmental factors on the cause of congenital malformations. An equal number of families with at least two healthy children were also studied. The families with the congenitally malformed children were divided into seven groups according to the nature of the malformation: 102 with a defective

The items in these letters are contributed by regular correspondents in the various foreign countries.

central nervous system, 15 with a defective blood or cardiovascular system, 46 with a defective alimentary tract, 6 with a defective genitourinary system, 55 with defective extremities, 3 with cutaneous abnormalities, and 14 with miscellaneous defects. The mothers who gave birth to congenitally malformed infants amounted to 0.67% of the mothers who gave birth in Turku maternity hospitals. Twenty-one of the families (8.7%) had more than one such child, with a total number of 46 malformed children in these families. There appeared to be a greater number of undefined genetic factors in the relatives of these families than in the other families, and 52% of the families had malformed relatives. The abortion rate for mothers with congenitally malformed infants was $9.4 \pm 1.9\%$ of all their pregnancies, and the percentage of abortions in the control families was only $6.8 \pm 1.6\%$. There were no differences between these two groups in the frequency of marriages between relatives, mentally defective suicides, epileptics, and stillborn children, but a significantly greater number of alcoholics was found among the parents of congenitally malformed children or their relatives than among parents and relatives of families with only healthy children. A greater frequency of congenital abnormalities in the relatives of the former group of parents than in controls was also noted.

The same abnormality occurred more than once in relatives of 25.5% of the families of malformed children and an abnormality of the same defect group in 46.5% of the defect-bearing families. Acute infections occurred at conception or during pregnancy in $19.0 \pm 2.5\%$ of all mothers of defective offspring, in $25.5 \pm 2.8\%$ of the mothers of offspring with a defective central nervous system, and in $14.5 \pm 2.3\%$ of the mothers of offspring of the other groups. Infections of viral and bacterial origin occurred with equal frequency (in $9.5 \pm 1.9\%$ of the mothers). No significant differences were noted between the defect-bearing and control families in the frequency of chronic diseases, operations, traumas, mental diseases, exposure to roentgen irradiation, or ill-effects due to drugs and poisons in the parents or in the frequency of diseases in their environment. The blood group combinations of the parents in the defect-bearing families differed significantly from those of the parents of the control families.

Thyroid Function and Pernicious Anemia.—Forssell and Halonen (*Acta med. scandinav.* **162:**61, 1958) described three patients with rare combinations of pernicious anemia and thyroid disturbances. In all these patients the anemia developed several years before any symptoms of thyroid disturbance were observed. In case 2 the diagnosis of pernicious anemia could not be regarded as definite, and the patient's later course showed persistent anemia of the normochrome type, which was almost refractory to treatment. In the first two patients acute thyrotoxicosis developed 10 and 12 years, respectively, after the anemia had been diagnosed. In both the anemia disappeared completely after subtotal thyroidectomy. The observation periods were three and one-half and five years, respectively, and the blood values remained normal without any antianemic therapy. In both a slight, postoperative hypothyroidism developed. In case 1, a vitamin B_{12} tolerance test showed normal resorption at the end of the period of observation. In case 3, spontaneous hypothyroidism developed two years after an anemia of definitely pernicious type had been diagnosed. No obvious change in the course of the anemia was brought about by the hypothyroidism, nor by adequate thyroidin treatment, although this caused euthyroidism. After 20 months with normal blood values and with the patient under liver and thyroidin medication a vitamin B_{12} tolerance test still yielded a pathological value of 0.2%.

Endogenous Clearance Values.—The serum creatinine and urea content were determined in 90, the serum indican in 80, and the uric acid in 50 patients with renal disease by A. Kasanen and co-workers (*Nord. med.* **60:**46, 1958). These values were compared with the respective clearances. There was a highly significant correlation between the serum creatinine, urea, and indican concentrations and the clearance tests. In the uric acid group this correlation was barely significant. In an unselected series of patients with renal insufficiency verified by clearance tests serum creatinine determination was nondiagnostic in 6%. The respective figures for serum urea were 10%, for indican 3.5%, and for uric acid 26%. According to the authors it is of no value to use endogenous clearance tests if the concentrations of creatinine, urea, indican, and uric acid in the serum are not normal.

Reserpine-Resistant Hypertension.—Juha Hakkila gave 30 patients a combined reserpine and oxamethonium (a bisquaternary ammonium compound and effective ganglion-blocking agent having relatively few side-effects) therapy as their blood pressures did not respond sufficiently to reserpine alone. The mean 24-hour dose of oxamethonium varied between 0.625 and 1.075 Gm. (*Ann. med. int. Fenniae* **47:**137, 1958). The mean period of observation was 4.4 months. The results obtained and the complications developing in connection with the treatment corresponded to those previously noted in the treatment with ganglion-blocking agents. The most common side-effects, constipation and dizziness, were mild and did not prevent the use of oxamethonium in the ambulatory treatment of hypertension.

Postoperative Lung Volume and Function.—T. M. Scheinin (*Annales chirurgiae et gynaecologiae Fenniae*, vol. 47, supp. 78, 1958) studied the alterations in lung volume and function during the first 20

days after intrathoracic operations in 66 patients and the first 10 days after high laparotomy in 33. Of the first group 17 underwent thoracotomy without removal of lung tissue, 28 underwent procedures ranging from segmental to bilobar resection, and the remaining 21 had pneumonectomies. The operations were generally accomplished under light inhalation anesthesia with muscle relaxation and controlled breathing. The various subdivisions of lung volume and the maximal breathing capacity were measured by means of closed spirometer circuits, and helium in air was used to determine the functional residual capacity. The minute-volume of breathing and derived measures were obtained by use of gas meter. The end-tidal gas was analyzed for oxygen and carbon dioxide by a micromethod. Various procedures were used in a series of 21 patients for relief of postoperative pain.

Thus at the conclusion of the operation polythene cannulas were inserted into the surgical incision for induction of regional analgesia with lidocaine solution, and in a number of patients morphine hydrochloride was given intravenously in a dose of 10 mg. per kilogram of body weight. Before operation the numerical differences in the volumetric and other data in the thoracotomy, lung resection, and pneumonectomy groups were slight and without statistical significance. A comparison between the measured values for lung volume and the calculated normal values showed likewise comparatively small preoperative differences between the groups. During the first 20 days after intrathoracic operations the values for total lung capacity and its various subdivisions were much reduced. The decrease was most pronounced in vital capacity and slightly less marked in total lung capacity, whereas a more moderate fall was noted in functional residual capacity and residual volume, and residual volume as the percentage of total lung capacity was increased. The greatest deviations from the preoperative level were observed two days after operation and later examinations showed a gradual return to the preoperative values.

Postcholecystectomy Syndrome.—O. Heinivaara and co-workers (*Ann. med. int. Fenniae* **47**:155, 1958) reported a series of 68 cholecystectomized patients with persistent abdominal distress after the operation. In addition to the routine examinations intravenous cholangiography was obtained on all patients. These examinations showed that in 44 patients the symptoms were derived from the biliary passages, and of these 4 had stones in the common bile duct. In 24 the underlying cause was found to be some other abdominal process such as ulcer or cancer. In patients with postcholecystectomy syndrome as the cause of their symptoms the findings on intravenous cholangiography were pathological in 78%. Cholangiography assisted in making the diagnosis of postcholecystectomy syndrome. In addition, intravenous cholangiography made it possible in many cases to decide whether the symptoms were due to biliary dyskinesia, a common duct stone, some other organic obstruction in the biliary passages, or a stump of the cystic duct. The clearing up of this question was of prime importance in deciding on surgical or conservative treatment.

INDIA

Intestinal Tuberculosis.—A. K. Dutta Gupta studied a series of 25 patients with intestinal tuberculosis (*Indian Journal of Surgery*, vol. 20, October, 1958). Of these, 14 were of the hypertrophic variety, the ileocecal region being involved in 13 and the rectosigmoid in 1; 4 of these had also bilateral involvement of the lungs and in 1 there was an associated genital tuberculosis with a "frozen abdomen." Five were of the ulcerative variety, the ulcers in the jejunum in three, in the jejunum and ileum in one, and in the anus in one; unilateral pulmonary tuberculosis was present in one and bilateral in two of these. Combined hypertrophic and ulcerative lesions were seen in three patients; in two the ileocecal region and ileum were involved and in one the ileocecal region and the transverse colon were affected; there was no pulmonary involvement in any of these cases. The sclerotic or fibrous variety was present in three, the ileum being the site of disease in all; one of these showed evidence of bilateral pulmonary tuberculosis. The common clinical features in hypertrophic and combined types were pain and swelling in the right iliac fossa. Fever and vomiting were common, constipation, loss of appetite, and borborygmi being some of the other complaints. Those with the ulcerative type more frequently complained of epigastric pain, vomiting, constipation, and visible gastric peristalsis simulating pyloric stenosis. Those with the fibrous type had diffuse abdominal pain, vomiting, distention, and visible peristalsis with the step-ladder pattern. The youngest patient in this study was 11 and the oldest 65. About 19 had symptoms extending up to two years. All had a moderate degree of anemia. The leukocyte count varied within normal limits with lymphocytosis in one patient. The sedimentation rate was raised in 20 patients, ranging between 32.5 mm. and 140 mm. (Westergren).

Gastric lavage and stool examination for tubercle bacilli gave negative results. The tuberculin test with 1:100,000 strength gave a positive reaction in 7 of the 10 patients on whom it was performed. No sputum was positive in two cases. Radiologic examination of the hypertrophic variety showed a filling defect in the cecum, in some associated with a filling defect in the ascending colon with an altered ileocecal angle or marked delay in emptying of the ileocecal region; or nonfilling of the

cecum, ascending colon, and hepatic flexure. The ulcerative type showed dilated stomach and duodenum followed by obstruction or a certain amount of delay of the the barium in the second part of the duodenum, with narrowing at the level of the crossing of the superior mesenteric vessels. The fibrous type with stricture showed dilated loops of small intestine with narrowing in places and stasis. Preoperative antitubercular treatment was given to all patients for three to nine weeks. Those with active pulmonary infection had only antitubercular treatment except one with ulcerative variety whose vomiting persisted although the lungs cleared up. Ileocolectomy was performed on nine patients with the hypertrophic variety, the extent of the ileum resected depending on the extent of ulceration. The one-stage operation was preferred. A short circuit was performed in the hypertrophic lesion of the rectosigmoid, the ileum being joined to the upper rectum. Gastrojejunostomy was performed on two patients with the ulcerative variety simulating pyloric stenosis. An ileoileostomy was performed on two patients with stricture and an ileotransverse colostomy on one.

There were two deaths; one occurred three years after operation, during which time the patient was in good health. Death was due to volvulus of a loop of small intestine with strangulation and perforation. The other death, one week after operation, was due to a pulmonary complication following operation; 14 were in good health without symptoms and with gain in weight and improvement of the anemia. The patient with rectosigmoid involvement complained of occasional heaviness in the lower abdomen with passage of mucus in the stools but no evidence of a protozoal or helminthic infection. Histopathological study in nine patients with ileocolectomies showed no caseation which might be due to adequate preoperative antituberculosis treatment. Lymph nodes showed typical tuberculous lesions with caseation in 10 patients. Culture for tubercle bacilli from scrapings of the cecal wall gave negative results and that from lymph nodes showed only one positive result.

Treatment of Coronary Insufficiency.—P. K. Sen (*Indian Journal of Surgery*, vol. 20, October, 1958) subjected five men varying in age from 36 to 67 years and with severe to moderate angina of effort of typical character and distribution to bilateral ligation of the internal mammary arteries to overcome the coronary insufficiency. One patient gave no clear history of myocardial infarction but all the rest had had one to four attacks before operation. In all of them the anginal element was predominant, a few steps being enough to produce pain. Local procaine infiltration supplemented by a small amount of thiopental or meperidine intravenously was the anesthesia of choice. The second interspace was usually chosen for approaching the artery. The identification and localization of these vessels was not always easy. No effort was made to dissect the vein from the artery. Serial electrocardiographic checks in the postoperative period are important as postoperative pain may hide a new cardiac infarct. A routine postoperative scout film of the chest was taken on the third and fourth postoperative day. The longest follow-up was about four months and the shortest six weeks. In all a marked increase in the sense of well-being and fitness was noticed. The anginal pains disappeared in all after operation. There were no significant electrocardiographic changes after operation.

Atomic Age Hygiene.—India started training her own physicists and those of southeast Asia in health physics, or the health aspects of radiation and atomic energy in November. The training will enable them to protect personnel directly involved in the use of atomic energy for peaceful purposes. The course was jointly organized by India's department of Atomic Energy and the World Health Organization with the cooperation of the U. S. Atomic Energy Commission. Over 20 physicists from India, Australia, China, Japan, Indonesia, the Philippines, and Thailand participated in the six-week course. The participants are expected to constitute a nucleus for future training of technicians in the safety aspects of atomic energy in their respective countries. The air monitoring division had established seven sampling centers in the country for obtaining samples of airborne dust, rain, and settled dust for radioactive measurements. A number of monitoring stations had been established in Bombay to estimate the general level of radioactivity in this area. In order to check the possible spread of contamination to the environment of any atomic plant or reactor, periodic radiation surveys of the soil, plants, insects, fish, and other organisms were conducted by the division.

Oxytetracycline in Preoperative Preparation.—DeSa and Gandhy (*Indian Journal of Surgery*, vol. 20, October, 1958) stated that the efficacy of antibiotics in promoting growth and elevating serum protein levels has attracted much attention in recent years. They studied the effect of oxytetracycline on lowered serum protein levels in a selected group of orthopedic patients. These patients suffered from such chronic bone and joint disorders as paraplegia with joint deformities, old fractures, and arthritis of the spine. None of them had any important source of protein depletion such as bed sores or abscesses. All were taking the hospital diet, were free from gastrointestinal disorders, and had normal hematocrit readings and normal liver function. They were studied in groups of two or more, one of each group serving as a control. Blood proteins were estimated initially and on two subsequent occasions at an interval of 15 days. A total of 15 pa-

tients were thus observed. In the first three series of three patients each, one received 25 mg. of testosterone propionate intramuscularly on alternate days for one month; another was given 50 mg. of oxytetracycline by mouth daily; and the third served as a control. The testosterone was dropped in the later series as it did not produce any significant rise in the serum protein level. The total plasma proteins were estimated by the specific gravity method and the serum albumin and globulin were estimated by paper electrophoresis. The vegetarian diet contained 78.6 Gm. of protein (19.2 Gm. from animal sources), 74.2 Gm. of fat, and 379.8 Gm. of carbohydrates and yielded 2,501 calories. The nonvegetarian diet contained 80.5 Gm. of protein (27.7 Gm. from animal sources), 74.2 Gm. of fat, and 355.5 Gm. of carbohydrates and yielded 2,418 calories. A consistent elevation of serum proteins was noticed in all the patients except two, with the use of oxytetracycline. In most, the total protein had risen in amounts varying from 0.1 to 0.8 Gm.%. Thus a positive effect in improving the protein content of the blood including albumin was obtained with this antibiotic.

Coarctation of the Aorta.—P. K. Sen (*Indian Journal of Surgery*, vol. 20, October, 1958) observed 10 patients with congenital coarctation of the aorta, 7 being above the age of 20, the oldest being 35, and one being a child of 3. Most of them came to the hospital only at the onset of severe symptoms and often with left ventricular failure. Most of them had dyspnea on exertion; three had headache and giddiness; two complained of cramps in the legs; and one patient, aged 22, had no symptoms and therefore refused operation. Six showed evidence of enlargement of the heart involving the left ventricle, while in two children the right ventricle was enlarged. All showed evidence of collateral circulation, including the child of 3 who had superficial vessels coursing all over the thoracic and abdominal wall. Five of the seven above the age of 20 had definite rib notching, which sign was absent in younger patients. All had hypertension which was, however, variable. Angiography for diagnostic purposes was performed on 5 patients and 5 of the 10 patients were operated on, with two deaths. Resection of the coarctation with end-to-end anastomosis was performed on three, wedge resection of the coarctation on one, and excision of the coarctation with homografting on one.

One of the operative deaths was due to cardiac arrest in a 10-year-old child, which occurred on releasing the distal clamp after completion of excision of the coarctation and end-to-end anastomosis. The arrest was probably due to anoxia; heart action returned within six minutes after cardiac massage but death occurred six hours later. The second death was due to a late secondary leak from the suture line and the formation of a false aneurysm which ruptured into the pleural cavity 46 days after operation. The author stressed adequate exposure with multiple rib resections if necessary. For a better mobilization of the coarcted segment, more intercostal vessels may be sacrificed, as adequate excision is most important. Interrupted suture was used for children and continuous sutures for patients over 15. Wedge resection may have to be performed in difficult situations, as in the case of a child in whom an adequate aortic pathway was restored after the resection with a good femoral pulse and a normal arm-leg pressure gradient. The clamps should be released slowly, the distal being released first. Postoperative heparinization was not done in these patients and was not found to be necessary or desirable. A suitable graft was always kept ready in case grafting became necessary after excising the affected segment. Three patients have done well after operation, including the one in whom a homograft replacement was performed.

ISRAEL

Health Service for Bedouins.—An eight-room central clinic for the Bedouins of the Negev was opened in Beersheba. Two physicians and a staff of nurses will be available to attend to the patients, who will come from all the Bedouin tribes in the area. There are about 14,500 Bedouins in the Negev, divided into 18 tribes and inhabiting an area of about 1,100 sq. km. to the east and south of the city of Beersheba. The Ministry of Health initiated a health service for the Bedouins in 1949. The medical services were organized under the supervision of a doctor and a nurse. Later two young Bedouins were trained as orderlies and two girls also helped, but in spite of all efforts no additional candidates could be found. In addition to Beersheba, there are now clinics for Bedouins at Um-Batit, El el Malach, and Sakib. The number of patients is growing yearly. It was 7,440 in 1956; 9,638 in 1957; and 10,307 in 1958 (up to the end of November). Although some tribesmen attend regularly, others do not appear at all. Some go to private doctors or dervishes, of whom there are many. Some of the latter use Arab remedies, such as making burns on the skin above the site of the pain, and others make and sell amulets. At the clinic, at first the Bedouins were treated free, but at the end of 1955 a charge of about 25 cents per visit, including medicines, was instituted. Since June, 1958, the charge has been fixed at about 50 cents. Patients who are unable to pay are treated free.

Tuberculous patients are hospitalized free of charge, adults being accommodated at the Hospital for Lung Diseases in Nazareth, and children at the Eitanim Hospital near Jerusalem. The clinic main-

tains close contact with the Hadassah Hospital in Beersheba, where many Bedouins attend the clinics and are accepted for hospitalization. A few women now have their children in the hospital. The Bedouins must pay for maternity services. Bedouins visit the eye, skin, and ear, nose, and throat specialists at the Kupat Holim Central Clinic. Whenever necessary, they are accepted at government hospitals. The commonest disease among them is tuberculosis. In 1957, 4,200 Bedouins were inoculated against smallpox. In the same year parents were asked to bring their children for inoculation against poliomyelitis; 50% of the children of the ages eligible for inoculation received the first injection, and 25% were brought for the second. In 1958, 1,760 children were inoculated against poliomyelitis, 70% of those eligible receiving one injection and 50% receiving two.

Health Conditions in Israel.—During the fourth meeting of the World Jewish Medical Association which took place in Israel in August, S. Btesh, Director General of the Ministry of Health, said the development of health services in Israel must be viewed against the background of a multiplicity of factors, the most important of which are the development of voluntary health agencies during the Mandatory period, the law of the return giving every Jew in the world the right to immigrate to Israel; the advent of mass immigration during the years 1948-1952; the nonselective character of this immigration; and the influx of a large number of Jews from underdeveloped countries. The state of health of the Jewish population at the end of the Mandate was fairly good. The infant mortality for the Jewish sector was 29.2 per 1,000 live births and the crude death rate was 6.4 per 1,000. With the influx of immigration the country was faced with the introduction of a large number of disease-carriers and of persons susceptible to such diseases as tuberculosis and poliomyelitis. The lower standard of living, the lack of proper housing, and the ignorance of the immigrants in matters of hygiene resulted in a deterioration of the health of the people, culminating in a rise of infant mortality and crude death rates, and the spread of tuberculosis, poliomyelitis, and malaria.

Intensive health measures resulted in effective control of most of these conditions, with the result that at the end of the 10-year period the health conditions of the country compared favorably not only with those of the pre-1948 period but also with those of many prosperous and progressive countries. The infant mortality in 1952 was about 32 per 1,000 live births, life expectancy at birth was about 70 years, maternal mortality dropped to 0.63 per 1,000 live births, tuberculosis morbidity reached the low figure of 5.7 per 10,000, and tuberculosis mortality was only 6.1 per 1,000,000. Malaria has been practically eradicated and an intensive vaccination campaign has succeeded in reducing greatly the incidence of poliomyelitis. The number of physicians in the country is about 1 for every 450 inhabitants and the ratio of general hospital beds is about 3 per 1,000 inhabitants.

Myocardial Infarction and Serum Lipids.—At the same meeting D. Brunner and J. Agmon reviewed the differentiation in the various Jewish groups of population—especially Yemenites—concerning atherosclerosis, nutritional status, and myocardial infarction. After the large immigration involved in "Kibbutz Galuyoth," the population now contains Ashkenazic Jews, who have a high incidence of coronary artery disease in middle age as occurs in the western world. On the other hand there are the Yemenite Jews, who are practically free from atherosclerotic heart disease and angina pectoris in middle age. In chemico-analytical and in paper-electrophoretic investigation it was found that the absolute level of β-cholesterol in milligrams per 100 cc. and the relative per cent of α-cholesterol were the best indexes of atherogenic activity. β-cholesterol is the lipid fraction that migrates in the electrophoretic field with the β-globulins, belonging also to the β-lipoproteins. The analysis of the various lipid fractions on 74 patients with myocardial infarction showed that 40% had less than 250 mg. per 100 cc. of cholesterol (upper limit of normal). This resulted in the overlap which is always seen in comparisons of coronary patients and healthy subjects. Only 10.8% of the patients examined had a β-cholesterol level of less than 180 mg. per 100 cc. This level of β-cholesterol distinguishes more clearly between coronary patients and healthy subjects than the total cholesterol level and markedly reduces the overlap.

In the present study none of 32 Yemenite farmers had a level of β-cholesterol over 180 mg. per 100 cc. Values less than this were believed to exert a "protective" effect with regard to coronary artery disease. This relatively high level of β-cholesterol even in patients whose total cholesterol was within normal limits (less than 250 mg. per 100 cc.) was due to the fact that in patients with coronary disease only a small fraction of the cholesterol moved with the α-lipoproteins on electrophoresis. In 94 patients with myocardial infarction the average percentage of α-cholesterol was 14 ± 3.13. In the Yemenites 27% of the total cholesterol was bound to the α-globulins (in spite of the low level of total cholesterol in this group). Thus among the Yemenites the percentage of α-cholesterol was nearly double that of patients with coronary disease and also 33% higher than the α-cholesterol percentage in the healthy Ashkenazi. The absolute values of α-cholesterol in milligrams per 100 cc. were similar in all the healthy and nonhealthy men investigated

in the Ashkenazi as in the Yemenite groups. This finding showed that the lipid changes nearly always occurred in the β-lipoprotein fraction. The failure of studies in America to distinguish by lipid pattern between persons with and without coronary artery disease might be due to the fact that subjects without evidence of coronary artery disease might have undergone subclinical atherogenesis. Hence, only by using control groups known to be free of coronary artery disease, such as Yemenites, is it possible to demonstrate real differences between the lipid patterns of normal persons and those with coronary artery disease.

Urolithiasis.—At the same meeting A. de Vries reported the incidence of urolithiasis in 12 settlements, selected because of different climate and ethnic composition. The incidence was high—11.8% (14.4% in men and 8.8% in women) and ranged in the various settlements from 1.6 to 34.1%. It was highest in the hottest and lowest in the coolest regions, higher in immigrants from Europe than in those from the Middle East and northern Africa, low in those born in Israel and immigrants below the age of 18, and rose sharply with the attainment of that age. In most of the patients, the urolithiasis developed within the first five years after arrival in the country. It was rare in recent immigrants. Of the various factors commonly implicated in the cause that of low urine output, due to inadequate fluid intake not adapted to heavy extrarenal fluid loss, furnished the most comprehensive explanation of the observations made. Ethnic differences in incidence could be explained by differences in fluid intake, largely determined by transfer of drinking habits of the immigrants from their countries of origin.

West Nile Fever.—At the same meeting N. Goldblum said that although West Nile virus has been known for almost 20 years, the clinical manifestations evoked by it and its epidemiology have remained unknown for a long time. In the last five years, extensive investigations have been made on the epidemiology, immunology, and pathogenic role of this virus in Israel. West Nile virus has been shown to be the cause of a benign specific short-term fever occurring in epidemic form. The virus was isolated in many instances from the blood of patients with "fever" and a rise in specific antibodies was demonstrated. Thus, a new clinical entity was described and named "West Nile fever." The outstanding features of the disease in typical cases are: fever, glandular swelling, and a skin rash. The clinical spectrum seems to be wide, ranging from a mild abortive illness to severe encephalitis. Neurological involvements are usually mild and infrequent, but in a recent outbreak 12 aged patients with severe encephalitis were shown to have West Nile fever. Homologous complement-fixing and neutralizing antibodies develop shortly after the onset and immunity is probably lifelong.

During convalescence, heterologous antibodies develop to Japanese and St. Louis encephalitis viruses. Laboratory diagnosis is based on the isolation of the virus from the acute phase blood sample and/or the complement-fixation test. The epidemiology of West Nile fever in Israel is not altogether clear. The outbreaks exhibit a well-defined and regular seasonal incidence, being confined to the late summer months. They occur along the Mediterranean shore in delineated geographical areas, which constitute permanent foci of infection. The disease is transmitted to man by culicine mosquitoes. In Egypt, pigeons and crows were found infected with the virus. It may be assumed that the main cycle in nature is through mosquitoes and birds and the disease in man is an incidental infection.

UNITED KINGDOM

Shortage of Midwives.—There is a shortage of midwives both in hospitals and for domiciliary confinements. For the past 16 weeks the busy maternity unit at Park Hospital, Davyhulme, Manchester, had over half its beds closed because it could not obtain sufficient midwives. At other maternity hospitals whole wards were closed for the same reason. For the Manchester region, with its nearly 2,000 lying-in beds, the total establishment of available certified midwives is 664 and only 75% of the posts are filled. The Minister of Health is to receive a deputation from the Regional Hospital Board, the United Manchester Hospitals, and the Manchester City Council to discuss the hospital maternity service and to press for funds to build a new large maternity unit and smaller units for confinements conducted by general practitioners. The shortage of midwives is general throughout the country, although more acute in the north than in the south. Many units have closed in Sheffield, where a new maternity hospital remains unopened because of this shortage.

Domiciliary midwifery is also suffering from the shortage. The Working Party on Midwives recommended that no domiciliary midwife should be responsible for more than 55 deliveries a year, and the Royal College of Midwives compromised with 60, but in many areas the midwives are handling 100 or more deliveries a year. At present, a state registered pupil midwife receives $854 a year, less $345 deductions for accommodation. In general nursing she would earn $260 a year more. There is, however, apparently no shortage of pupil midwives. The shortage is in trained midwives who remain in practice. Within three years of qualification more than 70% of the 5,000 that are trained annually stop practicing. The hospitals are meeting the shortage

by discharging mothers and babies earlier, in some places on the seventh day. This throws additional strain on the few remaining hospital midwives. A scheme for delivery in hospital or in the patient's home under the care of a domiciliary midwife is being considered.

Richard Bright Centenary.—The centenary of the death of Richard Bright (1789-1858), the first scientific investigator of renal disease, was celebrated recently. His hospital, Guy's of London, marked the occasion by a combined round and the Bright Memorial Lecture, given by Prof. Max Rosenheim of University College Hospital. Bright was an Englishman who qualified as a doctor in Edinburgh in 1813. In 1820 he was elected assistant physician and in 1824 full physician to Guy's Hospital. In his "Reports of Medical Cases" in 1827 he linked proteinuria and edema causally with pathological changes in the kidney. Two papers on what has since been called Bright's disease appeared in 1836 in the first volume of *Guy's Hospital Reports*. Professor Rosenheim spoke of the advances since the days of Bright, when the coagulability of urine was demonstrated by boiling in a spoon. He compared this with the present-day pressurized column chromatograph, which identifies the amino acids in urine. He regretted that the term Bright's disease has persisted, because it describes what is in reality a group of syndromes. There is no close correlation between disordered function and pathological findings. Many of Bright's patients probably had the nephrotic syndrome.

Inadequate Sterilization.—The Nuffield Provincial Hospitals Trust studied the practice of sterilization in hospitals. The chairman of the advisory panel, Dr. J. Revans, said that this was the first phase of the trust's project on the organization of central sterile supply departments. In the last 14 months an operational research team appointed by the trust investigated the sterilizing methods used in a number of hospitals, including a London teaching hospital, and found that in all of them the methods used were defective. Imperfect sterilization may be one of the factors responsible for the high incidence of infection in hospitals today. The chief defect was inadequate staff to deal with the sterilization of instruments and dressings. The highest standard of aseptic technique was shown at a small hospital with few staff changes and an adequate, well-trained staff. Sterilizers, particularly when gas-operated, were not always satisfactory and were sometimes poorly maintained, as was much of the equipment placed in them. Drums used for the sterilization of towels, dressing, and gowns were often damaged, lined with unsuitable material, or packed so tightly that steam could not circulate. Of the supposedly sterile articles 18% were found not to be sterile. Generally speaking, sterilization techniques were better in the operating rooms than in the wards. This was attributed to better equipment and maintenance, and to the staff in the operating room being more aware of the importance of sterilization than the ward staff. Some operating rooms had leaking roofs and were infested with cockroaches. Of 17 autoclaves tested only 9 were working satisfactorily; 4 were unsatisfactory, and 4 were of doubtful efficiency. The chief cause of inefficient autoclaves was unsatisfactory working by personnel, who lacked supervision and were often not correctly trained. Such personnel are responsible for the sterilization of gloves, gowns, dressings, and other equipment, yet their pay is less than that of a doorman. The investigators recommended that hospital pathologists or bacteriologists carry out periodic tests on the effectiveness of autoclaves in hospitals.

Serum Glutamic Oxalacetic Transaminase.—A survey of 129 patients with suspected myocardial infarction by Keele and co-workers showed that the serum glutamic oxalacetic transaminase (SGO-T) level is almost always raised between 24 and 48 hours after a myocardial infarct (*Lancet* 2:1187, 1958). Of 75 attacks of pain proved to be due to this lesion at autopsy or by the appearance of pathognomonic electrocardiographic changes, only 2 were associated with an SGO-T level of less than 50 units during this period, an incidence of less than 3% false-positive results. The height of the SGO-T level at its peak was closely related to the prognosis. In eight of nine cases diagnosed as myocardial infarction an SGO-T value of over 300 units was associated with early death. Of 20 with a value between 200 and 300 units, 8 developed heart failure or a fall of systolic pressure below 100 mm. Hg, and 3 died within a month. Of those with an SGO-T level under 200 units, 23% developed heart failure and 5% died. Since most of the deaths were due to heart failure, these figures confirm clinically the experimental finding that the maximum level of SGO-T is related to the mass of muscle infarcted. Anginal pain at rest with an abnormal but not diagnostic electrocardiogram and a raised SGO-T level was found to carry the same prognostic significance as infarction proved by electrocardiography. Other conditions occasionally given rise to chest pain and a raised SGO-T level. Thus a false-positive test was found in 7 of 104 patients with a raised SGO-T level. A raised SGO-T level in a patient with an abnormal but nonspecific ECG carried the same prognostic significance as diagnostic changes in the Q and T waves. Even if the ECG shows no significant departure from the normal, a raised SGO-T level may indicate myocardial infarction.

MEDICAL LITERATURE ABSTRACTS

INTERNAL MEDICINE

Asthma and Diabetes. E. Helander. Acta med. scandinav. (no. 3) **162:**165-174, 1958 (In English) [Stockholm].

The author investigated the concurrence and the antagonism of diabetes mellitus and of bronchial asthma in a series of patients with either one or both diseases. Bronchial asthma was present in 3,151 patients and diabetes mellitus in 3,236. Thirty-six patients, most of whom were over 40 years of age, had both diseases simultaneously, with approximately the same incidence in terms of percentage of diabetes mellitus in patients with bronchial asthma (1.14%) as that of bronchial asthma in patients with diabetes mellitus (1.10%). The concurrence of both diseases appeared to be more common among women than among men. The incidence of diabetes mellitus in patients with bronchial asthma was much more frequent among those over 60 than among younger patients. There was a gradual increase in the incidence of diabetes mellitus among patients with bronchial asthma correlated with an increase in age, whereas the incidence of bronchial asthma among patients with diabetes mellitus was fairly equally distributed during the various periods of the life span. Both diseases were of a mild type when simultaneously present. Bronchial asthma was of an intrinsic nature, the specific allergy not being the precipitating factor in any instance. Asthmatic episodes were mild in most patients and were moderately severe in the remainder, being related to the respiratory tract infections. Of the patients who had diabetes mellitus as the main disorder, insulin was taken continually by 3 young patients and occasionally by 2. The remaining patients had a mild form of diabetes mellitus, and a slight or moderate abstention from carbohydrate intake was the only treatment necessary. Administration of corticotropin (ACTH) induced or exacerbated an already existing state of diabetes mellitus in 2 patients. The onset of bronchial asthma was followed in some patients by the diminution of symptoms of a preexisting diabetes mellitus; an analogous process took place with the onset of diabetes mellitus in some patients with bronchial asthma. Administration of insulin in small doses exacerbated the symptoms of bronchial asthma in some patients with diabetes mellitus. Asthma episodes were not accompanied by alterations in the blood carbon-dioxide-combining power or the blood glucose level.

Most workers who have studied the concurrence and the antagonism of diabetes mellitus and bronchial asthma observed that the concurrence of both diseases was lower with respect to the population as a whole than the incidence of each disease taken separately. They concluded that the 2 diseases were antagonistic. The results of this study, however, show that such disparity does not exist, because the concurrence of both diseases is similar to the incidence of each with respect to the population as a whole.

Spontaneous Strokes in the Young. H. Stevens. Ann. Int. Med. **49:**1022-1034 (Nov.) 1958 [Lancaster, Pa.].

The author reports on 32 healthy normotensive young persons, between the ages of 5½ and 45 years, in whom cerebrovascular accidents, characterized by acute hemiplegia and other focal neurological manifestations, occurred in the last 7 years. The patients were seen in private neurological practice; all of them were ambulatory and active, and most were white-collar workers representative of the population of Washington, D. C. None of the patients had traumatic, neoplastic, infectious, embolic, or other primary disease. Although the precise causative mechanism was not always established, 2 large categories of strokes in the young persons could be recognized, namely, those due to cerebral venous thrombosis and those due to cerebral arterial thrombosis. The first group consisted of 2 children with infantile hemiplegia, 12 women with puerperal hemiplegia, and 2 women with venous thrombosis of pregnancy. The other group consisted of 16 adults, 11 of whom were men, and some had thrombosis of the carotid artery. The diagnosis of the latter condition can often be made by clinical observation, including a history of acute onset of headache with contralateral hemiplegia, and ipsilateral Horner's syndrome. Palpation of the carotid artery and ophthalmodynamometry are valuable, but not infallible, techniques that deserve more frequent usage. Arteriography is often indispensable, particularly in excluding intracranial

The place of publication of the periodicals appears in brackets preceding each abstract.

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aneurysm or tumor, but it is often possible to avoid unnecessary, painful, or dangerous tests by careful analysis of the clinical data. None of the patients died, and residuals were uncommon. None has shown electrocardiographic changes or other evidence of progressive vascular disease. Only 2 of the 16 patients received anticoagulant therapy. Anticoagulants were not used in the 12 women with puerperal hemiplegia due to cerebral venous thrombosis. None of them died, and sequelae were rare.

Unfamiliarity with spontaneous strokes in young persons may lead the perplexed clinician to subject the patient to a series of elaborate tests to identify the elusive cause. Syphilis and hypertension are readily eliminated. Brain tumor, collagen disease, and congenital and acquired diseases of the vascular and hematological systems are then considered. The multiple tests necessary to investigate these various possibilities are usually negative, but the time consumed is often sufficient to permit spontaneous improvement. An erroneous diagnosis of multiple sclerosis is then often made by exclusion. Most spontaneous (arterial) strokes in healthy young persons are due to solitary atheromatous plaques similar to those observed in older patients. Stress seems to precipitate the attack in some cases, since in the series reported there was a definite history of acute stress in 5 men, and 1 woman had been under chronic duress for several months before her stroke occurred.

Development of a rational therapeutic program rests on accumulation and assessment of further data, especially on pathogenesis. The usefulness of anticoagulants in the treatment or prevention of a stroke requires further validation. Prognosis in these selected patients was generally good with no specific treatment. The indiscriminate use of anticoagulants without proper refinement of the heterogeneous diagnosis of stroke is hazardous. Increased bleeding into a hemorrhagic infarct is a particular danger.

Relationship Between Chronic Bronchitis and Bronchial Carcinoma. E. Gyurech-Vágó and M. Scherrer. Schweiz. med. Wchnschr. **88**:1132-1136 (Nov. 8) 1958 (In German) [Basel, Switzerland].

The authors report on 126 patients who were studied at the medical clinic of the University in Bern, Switzerland, with regard to pulmonary disorders preceding the onset of carcinoma. A history of a type of pulmonary disease other than carcinoma was elicited from 81 (64%) of the 126 patients. There were 33 patients (26%) with recurrent pneumonia, pulmonary tuberculosis, pleurisy, or trauma of the chest. Forty-eight patients (38%) had been affected with chronic bronchitis for many years, and 14 of these (11% of the 126 patients) had a definite history of bronchial asthma, which occurred before the bronchial carcinoma. Considerable depression in expiratory movements was revealed by respiratory function tests in 107 patients (85% of the 126 patients), with symptoms of diffuse bronchiolar obstruction which may have explained this depression. In 85 patients (65% of the 126) bronchial spasm was present.

The increased incidence of a history of bronchitis and of asthmatic symptoms in patients with bronchial carcinoma is remarkable. It suggests that, in contrast to the general opinion, bronchial asthma should not be interpreted exclusively as symptomatic of bronchial carcinoma (so-called associated asthma). A decisive causative correlation may be considered between bronchial asthma occurring in bouts or chronic asthmatic bronchitis (different from the so-called smokers' catarrh caused by excessive use of nicotine) and bronchial carcinoma.

The Treatment of Acute Leukemia in Adults. K. D. Kittleson and H. L. Alt. Quart. Bull. Northwestern Univ. M. School (no. 4) **31**:353-361, 1958 [Chicago].

The authors report on 24 adult patients with acute leukemia, who were treated in Chicago at the Veterans Administration Research Hospital between February, 1955, and June, 1956, and at Passavant Memorial Hospital between April, 1952, and August, 1957. Patients in the terminal acute phase of chronic leukemia were excluded. The diagnosis of acute leukemia was confirmed by the finding of large numbers of blast cells and pro cells in the bone marrow before treatment in all patients except one. In this one patient repeated attempts at bone marrow aspiration were unsuccessful, and a bone marrow biopsy showed myelofibrosis. The diagnosis of acute leukemia, based on peripheral blood and clinical findings, was confirmed at autopsy. The group included 20 men and 4 women, ranging in age from 22 to 77 years, the mean age being 47.5 and the median 49.5 years. Although no standard treatment program was followed, certain general principles were adhered to in most cases. Transfusions were given only when necessary to keep the hemoglobin concentration above 7 Gm. per 100 cc. Antibiotics were given for infections and occasionally prophylactically during periods of pronounced leukopenia. Eleven patients were treated with mercaptopurine and steroids alone; 10 were treated with these 2 factors plus folic acid antagonists (9 with Aminopterin and 1 with Amethopterin); and 3 were treated with the 3 factors plus nitrogen mustards.

Complete remissions, excluding the bone marrow, were achieved in 9 of the patients, and complete or partial remissions in 13. The complete remissions averaged 16 weeks in duration, and the partial remissions, 10.6 weeks. The median survival time after onset of the disease was 8 months. The most important factor affecting the outcome of

therapy appears to be age, the poorest results being obtained in patients over 50 years of age. Patients in whom the disease had been present for less than 2 months tended to respond better to treatment than those in whom it had been present for longer periods. The complications of treatment were essentially those of prolonged steroid therapy, the major ones being infection and gastrointestinal tract ulceration.

Echinococcus Disease in the United States. A. M. Katz and C. Pan. Am. J. Med. **25**:759-770 (Nov.) 1958 [New York].

The authors collected from the United States literature 556 cases of echinococcic infection which had been reported between 1822 and 1956. Most of these cases occurred among immigrants, and only 38 of the 556 cases can be considered to be native cases, being found in 14 states and appearing at a rate of about 6 each decade since 1900. The authors report what they consider the first native case from Massachusetts, which occurred in a 44-year-old woman living in a suburb of Boston. She was born in Boston and had never lived in a rural neighborhood, and the nature of her exposure was not determined. The patient was first seen at the Massachusetts General hospital in 1946. At that time she complained of pain in her left thigh dating back 6 years. Roentgenograms showed a mass which had partially destroyed the left wing of the ilium, protruding into the pelvis as a calcified cyst. A chest roentgenogram showed a density in the lower right lung field. The patient was seen again in 1951, when she presented with a large, tender, fluctuant mass overlying the left ilium posteriorly. Anteriorly, a mass was palpable deep in the lower left quadrant of the abdomen. The patient's temperature was 102.4 F (39.1 C), and the white blood cell count was 17,700 per cubic millimeter. Roentgenograms of the pelvis showed a large increase in the size of both the area of bone destruction and the calcified cyst. A chest roentgenogram showed several new round densities in each lung. After a course of penicillin and streptomycin the abscess was opened and was found to communicate with the ilium. A grape-like cyst was found in the pus which flowed out of the incision. On microscopic examination the cyst had a laminated, acellular membrane consistent with that of an echinococcic cyst. The result of the Casoni intradermal test was negative. For several weeks large amounts of pus containing similar cysts drained from the wound. Two additional explorations of the left hip revealed that almost every tissue cut through contained cysts. The entire wing of the left ilium was removed, but the stump of bone left behind was riddled with cysts. In December, 1955, the patient was readmitted to the Massachusetts General hospital for pleuritic pain in the left side of the chest, cough, and fever. Microscopic examination and culture of the sputum revealed a mixed bacterial flora. After treatment with penicillin, the patient's temperature dropped, and production of sputum ceased. She was discharged 10 days later, and during the next 2 years her clinical state improved. Her hip still drains, but there has been no change evident on roentgenographic examination. Eleven years after discovery of the hydatid infection she is managing her household and has gained so much weight that she is planning to diet.

A review of the 556 cases collected from the literature showed that an echinococcic cyst may be found in any organ of the body but most often in the liver. When the cyst was found in the liver, fewer than 10% of the cases were accompanied by cysts in distant organs. Hydatid infection of organs other than the liver, while less common, was associated with distantly located cysts in 20 to 35% of the cases. Of all the patients, only 10% had cysts in more than one organ. It had recently been shown that the 2 clinical forms of this disease are caused by different species of the parasite. The unilocular cyst is caused by Echinococcus granulosus, and the invasive alveolar cyst is produced by E. multilocularis. The manifestations of intact, alveolar, infected, partially ruptured, and acutely ruptured cysts are different, and clinical diagnosis is often difficult. The Casoni skin test and the complement-fixation test increase the accuracy of diagnosis but cannot be counted on either to rule in or to rule out the disease. Definite diagnosis requires recovery and identification of the parasitic elements. This is difficult and often impossible. Although there is a newly discovered reservoir of echinococcosis in northwestern Canada and the prevalence of hepatic infection among cattle in the United States is about 0.01%, it does not appear that this disease is becoming a public health problem in the United States.

Experiences with Sulfonylurea Therapy in Tuberculous Patients with Diabetes Mellitus. S. Marton, T. Bànyàsz and E. Medveczky. Acta tuberc. scandinav. (no. 1) **36**:36-50, 1958 (In German) [Copenhagen].

Since February, 1956, the authors have used sulfonylurea preparations in the treatment of 28 patients in whom diabetes mellitus was combined with tuberculosis. The patients were treated with brands of carbutamide. Twenty-six of the 28 patients had active, and usually severe, multicavernous tuberculosis. The accepted criteria for the selection of diabetic patients for treatment with orally administered antidiabetic drugs were followed in all but 6 of the patients; in 3 of these the diabetes had become manifest at age 21 or before, and the other 3 were slender, older diabetics. All 6 of these patients required large doses of insulin.

In patients in whom the orally administered antidiabetic sulfonylurea compounds were expected to be adequate for control, the insulin was withdrawn at once and 5 to 6 tablets were given daily in 3 divided doses, whereas in patients having the characteristics of the aforementioned 6 patients (large insulin requirements), the sulfonylurea compounds at first were combined with half of the usual insulin dosage. The concentration of sulfonylurea in the blood of the patient was at first ascertained daily, and later at intervals of 2 weeks; the blood sugar concentration and the liver function were controlled at the same time. The maintenance dose of sulfonylurea was usually 2 tablets.

With such maintenance doses it was possible to achieve complete control of the sugar metabolism in 10 of the patients. In 5 other patients control could be achieved with small additions of insulin. Among the 13 patients who failed to respond to the sulfonylurea therapy, there were 7 in whom according to present-day criteria this treatment would not be tried (extremely unstable sugar metabolism and high-insulin requirements); in these the oral antidiabetic therapy had merely been given on a trial basis. The remaining 6 patients included only 2 in whom all the criteria for successful oral therapy existed. The authors feel that in patients in whom diabetes has begun at an early age oral antidiabetic therapy is not likely to be successful.

In patients with active tuberculosis who are free from fever, the antidiabetic efficacy of sulfonylurea depends on the same factors as in nontuberculous patients. If, however, the tuberculous process is extremely severe, extensive, and accompanied by caseous break-down, then the infectious factor may, in some cases, impair or completely abolish the antidiabetic effect of the sulfonylurea compounds. In tuberculous patients in whom the sugar metabolism is stabilized by the orally administered sulfonylurea, antituberculotic drugs are just as effective as they are in those who are effectively treated with insulin. The authors conclude that the use of sulfonylurea preparations is justified and effective in some tuberculous patients with diabetes mellitus.

Carbutamide (BZ 55) in 300 Diabetics: Experiences. A. Cabarron, H. V. Caino, N. O. Bianchi and O. Pintado. Rev. Asoc. méd. argent. **72**:306-307 (Aug.) 1958 (In Spanish) [Buenos Aires].

Three hundred patients with diabetes were treated with carbutamide (BZ 55) during the past 2 years in the department of nutrition of the San Martin General Hospital in Buenos Aires. The majority of the patients were between the ages of 30 and 60 years. Two hundred twenty-seven patients were obese. Before starting carbutamide therapy, 244 of the patients were under treatment with insulin in doses which varied between 20 and 60 units for periods ranging from 4 to 14 years. Diabetes was moderate in 250 patients, moderately severe in 12, and severe in 11. Seventy-nine patients had degenerative vascular lesions, which were not present in the remaining 221 patients. Carbutamide produced satisfactory hypoglycemic effects in all cases, and these were maintained for some time after withdrawal of the drug or during transgressions of the diet by the patients. The patients were observed by periodic clinical examination, with the taking of hemograms and hepatograms, determination of the renal function, and electrophoresis of the proteins obtained by puncture hepatic biopsies.

The results of treatment in 300 diabetic patients for nearly 2 years led the authors to conclude that carbutamide (BZ 55) is the most efficacious hypoglycemic drug administered orally. It does not produce habituation, degenerative vascular lesions, or other untoward effects. Glycemia is estabilized at a proper level, and the maintainance doses are moderate. The control of hyperglycemia in diabetes is higher with carbutamide treatment than with tolbutamide (D 860) treatment. In the cases observed by the authors, when the clinical nature of the diabetes and the biotype of the patients were favorable, the response to carbutamide therapy was satisfactory in 81% of the patients, was fair in 13%, but failed in 6%. When the nature of the disease and the biotype of the patient suggested only a relatively moderate response to treatment, the results were satisfactory in 58% of the patients, fair in 19%, and poor in 23%.

Acute Gastric Dilatation Due to Nasal Oxygen. J. W. Marrs, R. V. Walker Jr. and W. W. Glas. Ann. Surg. **148**:835-839 (Nov.) 1958 [Philadelphia].

The authors report on 7 patients with acute gastric or gastrointestinal dilatation, who had been admitted to the Wayne County General Hospital in Eloise, Mich., for various surgical conditions, such as fractures, burns, laceration of the upper extremity, and strangulated hernia. They were in profound shock on admission and were treated by nasal administration of oxygen. Six of the patients died. In these 6 instances the association between the nasal administration of oxygen and acute gastric dilatation was not recognized until the patient was in a dying state or had died. The clinical features of the syndrome observed in the 7 patients showed the following consistent factors: nasal administration of oxygen, rapid abdominal distention, and cyanosis. The blood pressure and pulse varied, depending on the extent of the gastric dilatation and the patient's respiratory function. Roentgenograms of the abdomen invariably revealed marked gastric distention. Nausea, vomiting, and belching were usually present despite

nasogastric suction. Aspiration pneumonitis was a secondary hazard associated with acute gastric dilatation.

In order to substantiate the authors' clinical impression that nasal administration of oxygen could cause acute gastric dilatation and death, experiments were carried out on 6 anesthetized dogs to which oxygen was delivered at 3 liters per minute through a Levin tube which was inserted into the hypopharynx or the esophagus. In all the dogs acute gastric dilatation was produced with marked cyanosis and electrocardiographic changes. Moreover, if a no. 18 needle was passed through the epigastrium into the stomach or the intestine of a dog in which gastric dilatation had been produced experimentally, immediate decompression followed. If irreversible changes due to anoxia did not occur, the spirometric and electrocardiographic recordings returned to normal. None of these dogs developed peritonitis, and all had an uneventful recovery, but experimental evidence indicated that acute gastric dilatation can cause marked impairment of respiration, vagal stimulation, myocardial damage, and even death.

Several factors may be involved in the causation of this syndrome of acute gastric dilatation due to nasal oxygen. If the nasal catheter is inserted too far past the soft palate, 3 or 4 liters of oxygen are delivered to the hypopharynx. In an unconscious or severely injured patient, the base of the tongue may relax to form a valve, and a portion of the gas inevitably finds its way into the esophagus. Swallowing of blood or saliva allows even more oxygen to enter the esophagus, and acute gastric dilatation occurs. Nasogastric suction is beneficial but has not been effective, in the authors' hands, in relieving the acute gastric dilatation. To prevent this complication, all catheters for the nasal administration of oxygen should be inserted by a physician under direct vision. The tip of the tube should lie at the level of the soft palate. But even with the nasal catheter in proper position, if the mouth is completely or partially occluded from trauma or blood, there is potential danger in delivering oxygen to the hypopharynx or the esophagus with resultant gastric dilatation.

The Syndrome of Temporal Arteritis: (Personal Observations and Critical Evaluation of the Syndrome While Reviewing the Literature). R. Spapen. Acta clin. belg. **13**:384-414 (July-Aug.) 1958 (In French) [Brussels].

The syndrome of temporal arteritis has found steadily increasing attention and has become a recognized clinical entity. This condition, also called Horton's syndrome or giant-cell arteritis, is a diffuse vascular disease affecting particularly persons in the older age groups; its causation, however, remains unknown. The symptoms are unspecific at the onset of the disease and may be limited for several weeks or months to systemic reactions, such as fever, chills, general malaise, weakness, anorexia, and loss of weight. This stage is followed by local manifestations, including severe headache with tenderness, swelling, and inflammation of the temporal artery on one side or on both sides. Temporal arteritis is often complicated by severe ocular involvement, such as amblyopia and amaurosis, and by other less frequently occurring lesions of the brain, the myocardium, and the mesentery. The course of the disease is characterized by the successive occurrence of exacerbations and remissions for periods ranging from 2 to 6 months. The prognosis for patients with temporal arteritis, so far as life is concerned, is good.

Pathologicoanatomic studies have revealed giant-cell panarteritis involving particularly the cranial arteries. Laboratory findings almost continually indicate in these patients a significant increased erythrocyte sedimentation rate, disturbances in the protein level of the serum with hypoproteinemia, and an increased ratio of alpha$_2$ and gamma globulins. The results obtained by the administration of broad-spectrum antibiotics in conjunction with corticotropin (ACTH) or corticosteroids suggest that this medication represents the present-day treatment of choice in patients with temporal arteritis.

An Analysis of 120 Aspiration Needle Biopsies of the Kidney. L. R. Sarin and J. C. Sarin. J. Indian M. A. **31**:319-320 (Oct. 16) 1958 [Calcutta].

During the last 2 years the authors performed 120 renal biopsies with the patient in the sitting position. As a preliminary to renal biopsy, the clotting time, bleeding time, and prothrombin time were determined in each case to exclude any patient with hemorrhagic diathesis. Local anesthesia was used. The tissue obtained was fixed in a saline solution containing 10% formaldehyde. Paraffin embedding and hematoxylin-and-eosin staining were carried out as a routine measure. The patient was advised to rest in bed for the next 24 hours and was closely observed. Almost all patients in whom renal biopsy was successful had microscopic hematuria lasting for 24 hours and mild backache. Eight patients showed gross hematuria. In one patient the hematuria lasted 8 days, but there were no other harmful effects. The authors observed no bacteremia or perirenal abscess, in spite of the fact that at least 10 of the patients under investigation were found to have chronic pyelonephritis.

Adequate renal tissue was obtained in 103 of the 120 biopsies; in 3 biopsies renal medulla but no cortex was obtained; in 10, fibromuscular tissue; and in 3, liver tissue. In 46 patients with the nephrotic syndrome, renal biopsy alone established the underlying disease. Amyloidosis, chronic lobular nephrosis, pyelonephritis, Ellis type 1 and

Ellis type 2 nephritis accounted for most of these cases. In approximately 20% of the cases clinical and other laboratory procedures pointed to the diagnosis. In a case of pulseless disease, the renal biopsy helped to reveal the underlying pathology of polyarteritis nodosa as a cause of the syndrome. In 36 patients, under 30 years of age, who had diabetes mellitus, renal biopsy revealed morphologic changes that had been considered rare in young persons.

Renal biopsy on 24 patients with pulmonary tuberculosis revealed renal tuberculosis in 3 patients in whom there was neither clinical nor laboratory evidence of the disease; others showed glomerulonephritis, amyloidosis, and pyelonephritis. The other patients on whom renal biopsy was performed had miscellaneous conditions, such as essential hypertension, rheumatoid arthritis, disseminated lupus erythematosus, epidemic dropsy, toxic myocarditis, progressive muscular atrophy, and respiratory infections. It was found that not all cases clinically diagnosed as essential hypertension have the same pathology. The basic lesion in 6 cases was found to be subacute diffuse glomerulonephritis, nephrosclerosis, and pyelonephritis. A patient with rheumatoid arthritis treated with cortisone showed remarkable renal changes. Renal biopsy was more helpful than any other method in establishing the prognosis.

Atrial Fibrillation and Epidural Hematoma Associated with Lightning Stroke: Report of a Case. Z. V. Morgan Jr., R. N. Headley, E. A. Alexander and C. G. Sawyer. New England J. Med. **259**:956-959 (Nov. 13) 1958 [Boston].

A 52-year-old man was admitted to the hospital in a semiconscious state. He had been found approximately 10 minutes earlier lying unconscious on the floor of a power substation. A lightning storm was in progress at the time. As he was brought into the emergency room, he vomited bright red blood. Physical examination revealed a man in acute distress, responding only to painful stimuli. All deep tendon reflexes were active. The left side of the face was disfigured by burns. There were areas of burns below the left scapula, over the left acromion process, and at the base of the great toe, and there was a 6-cm. laceration over the parietal area on the right. The nose was full of dry, crusted blood. The lung fields were clear on percussion and auscultation. Examination of the heart revealed atrial fibrillation with an apical rate of 80.

An electrocardiogram confirmed the diagnosis of atrial fibrillation, and the patient was given 0.2 Gm. of quinidine gluconate intramuscularly. The scalp laceration was cleansed and sutured. The second-degree burns were débrided of loose skin and were left open to air. After the initial dose of quinidine gluconate, the patient was given 0.2 Gm. intramuscularly every 4 hours, receiving doses at 9:10 p. m. and at 1 a. m., 5 a. m., and 12 noon on the next day. After this, he received 0.2 Gm. every 6 hours. The pulse was now regular, and a normal sinus rhythm was confirmed by electrocardiogram. X-ray examination of the skull showed a linear fracture through the right parietal and temporal bones.

The patient remained semiconscious. Quinidine administration was discontinued after 5 days. Two days later the scalp sutures were removed. Healing appeared satisfactory. Examination at this time showed diminished muscle strength in the left upper extremity, and periodic reexaminations during the next 12 hours showed progression of the weakness. In addition, a left-sided homonymous hemianopsia was found. A temporoparietal craniotomy was performed on the right to remove a huge epidural hematoma. It had apparently originated from a tear of the right middle meningeal artery. Bleeding had ceased, but, when the clot was removed, it resumed from this vessel until it was controlled with a silver clip. On the next day the patient was mentally clear for the first time since admission and had a marked gain in muscle strength. Ten weeks after the lightning stroke the burns had healed. The deep tendon reflexes were normal, as was the muscle strength. The patient complained of symptoms characteristic of postural hypotension but was well otherwise.

The fibrillation promptly responded to quinidine, but the literature suggests that this arrhythmia may revert to a sinus rhythm spontaneously. Quinidine appears to be the drug of choice for antifibrillatory treatment. Apparently, the electric shock threw this patient to the floor with sufficient force to fracture his skull and cause an epidural hematoma. A comatose or semicomatose state may ensue from electric shock. Until lateralizing signs develop, it may be impossible to separate coma from electric shock from that due to intracranial hematoma. Surgical treatment of the hematoma apparently produced cure.

SURGERY

Treatment of Persistent Ductus Arteriosus with Reversal of the Shunt by Means of Slow Ligation. I. Boerema. J. Internat. Coll. Surgeons **30**:553-567 (Nov.) 1958 [Chicago].

In patients with pulmonary hypertension, ligation or suture of the ductus arteriosus causes a high mortality. Ligation of the ductus is extremely dangerous, especially when the direction of flow in the shunt is reversed, i. e., when blood flows from the pulmonary artery into the aorta. Surgical intervention offers far less risk, however, when occlusion of the duct occurs slowly. The author developed a method of slow ligature which makes

it possible to close large vessels as gradually as required. The principle of this slow ligature is based on the swelling of laminaria by absorption of water. By tying a little plastic sac, packed with laminaria and provided with a small opening by which water enters the sac, quite loosely around the vessel which is to be ligated, one immediately produces an insignificant obstruction of the vessel. The increasing swelling of the packed laminaria tightens the thread, so that gradually the total ligation of the vessel is completed. In this way the development of sufficient collaterals is stimulated, and spasm is avoided. By this simple method large vessels were closed completely in dogs. No clinical symptoms due to ischemia of the closed-off organ were observed.

As the simple method of partially tying the vessel with a thread over the laminaria is not practicable in patients with patent ductus arteriosus, the author devised a ring of plastic built around the patent duct. From one side in the ring a plastic cylinder protrudes into the lumen, moving toward the center, so as gradually to close off the lumen of the ring completely. The cylinder is pushed out in order to compress the vessel by means of swelling of the laminaria, which fills a closed chamber behind the cylinder. This chamber has an opening 1 mm. in diameter, which allows the tissue fluid to enter the chamber. Consequently the laminaria swells, but very slowly, as the opening is small. In the plastic ring and in the cylinder, metal marks are built in, so that roentgen-ray examination of the patient gives an exact picture of the drive out of the cylinder. Thus, one can follow exactly when the lumen of the ring is closed, which means that the duct has gradually closed completely.

This technique was employed in a 9-year-old girl who had 5 attacks of severe pneumonia due to an atypical patent ductus arteriosus. At thoracotomy a ductus was found with a diameter of 8 mm. The left pulmonary artery had about the same diameter as the aorta of an adult. The pressure in the pulmonary artery was 70 mm. Hg systolic and 60 mm. Hg diastolic and in the aortic arch, 90 mm. Hg systolic and 70 mm. Hg diastolic; in the descending portion of the aorta there was a mean pressure of 45. Thirteen minutes after clamping on the ductus arteriosus, the pressure in the pulmonary artery was 75 mm. Hg systolic and 50 mm. Hg diastolic; in the aortic arch, 170 mm. Hg systolic and 120 mm. Hg diastolic; and in the descending portion of the aorta, 45. It was quite clear that sudden closure of the duct would cause the death of the child. The patient, therefore, was given a trial slow ligation. Three months after that a rethoracotomy was performed, which showed the ductus to be completely closed. It was doubly ligated and transected. The pulmonary artery was still enormously dilated. The descending portion of the aorta had a diameter not larger than that of a pencil. Slow ligation did not cause any critical moment during closure of the duct. The pulmonary pressure fell gradually during 7 weeks to the very low level of 12 mm. Hg systolic and 7 mm. Hg diastolic. The recovery of the child was uneventful. She is now much livelier than before the operation and has no complaints whatsoever. Thus, the method of slow ligation of the patent ductus arteriosus was successful in a dangerous case. In patients with severe pulmonary hypertension with reversal of the shunt, this method seems decidedly worth giving a trial.

Late Results of Operations for Fallot's Tetralogy. M. Campbell. Brit. M. J. 2:1175-1184 (Nov. 15) 1958 [London].

Three methods of surgical treatment are now available for the tetralogy of Fallot: (1) subclavian-pulmonary anastomosis or some modification of it; (2) Brock's direct operations of pulmonary valvotomy or infundibular resection or both; and, more recently, (3) open operation with closure of the ventricular septal defect and relief of the stenosis. This paper reviews, first, the results of the anastomotic methods. In a report made in 1953, the author had included 200 patients with all types of morbus caeruleus (cyanotic group of congenital heart disease, with persisting venous-arterial shunt). In this paper he considers only those whose disorder was diagnosed as Fallot's tetralogy; although this group includes some in whom autopsy revealed more complex lesions, it excludes those with pulmonary atresia or tricuspid atresia. There remained 130 patients in whom the results of anastomotic operations were excellent or good, and 126 of these were either seen recently by the author or followed up otherwise. Eight of the patients (6%) have died, and 17 (14%) have lost much or all of their improvement, but 101 (80%) are in as good, or nearly as good, condition as they were. These have been followed for an average period of 7½ years. Ten of the 17 patients in whom there was loss of improvement have already had direct operations; 6 obtained good results, but the other 4 died.

Commenting on direct operations for Fallot's tetralogy, the author says that the results of pulmonary valvotomy and infundibular resection in the first 100 patients operated on by Brock were reported by him and others in 1954. The operative mortality was 15%; there was little or no improvement in 14%, but there were good results in 71%—figures not very different from those after anastomotic operations, except that the operative mortality was higher. Now a longer follow-up is reported on 61 of these patients, and another 50 who were operated on between 1953 and 1956 are added to the series. The operations performed on these 111 patients were mainly infundibular resection in 47, pulmonary valvotomy in 42, or both

procedures in 22. Nineteen of the 111 patients died at or soon after operation, 13 obtained little or no improvement, and 79 (71%) obtained good results. None of these 79 has been lost sight of, and they have been followed for an average period of nearly 5 years—32 for from 6 to 9 years. Of the 79 who obtained good results, 70 (89%) have remained well during the subsequent years.

The long-term advantage of the direct operations is greater than the figures indicate, for there were only half as many deaths and half as many patients who lost all their improvement with direct as with anastomotic operations. It is thought that perhaps half of those who obtained good results may be reasonably well 20 years after operation. After anastomotic operations, increasing difficulty in hearing the continuous murmur is a bad sign, and, if it cannot be heard, the anastomosis has probably closed. The auscultatory signs after direct operations are not so much help. The reduction in anoxemia and resultant polycythemia and in the high hemoglobin level that was found 3 or 4 years after the operation has been maintained in most patients for the 6 to 10 years of this longer follow-up, but not in those who had lost their clinical improvement.

The heart increases in size within a few weeks after a successful anastomotic or direct operation. The ideal is a limited increase, large enough for a reasonable pulmonary flow that will enable the patient to do more but not large enough to throw an undue strain on the heart. This increase is generally about 10%; it is unlikely to be progressive, and there is no reason to be anxious about it. In fact, if a heart that has become larger returns to near its original size, especially if the hemoglobin returns to its original level, the anastomosis has probably closed or the increased pulmonary flow has been lost by the stenosis becoming more severe. Neither of these operations for Fallot's tetralogy is curative, for the ventricular septal defect remains. Generally, however, they produce great improvement that lasts for many years. When the ventricular septal defect can be closed, it should not be difficult to relieve the infundibular or valvular stenosis.

Ewing's Sarcoma: Ten-Year Survivals: Report of a Case with Recurrent Pulmonary Metastases. H. N. Harrison. Ann. Surg. **148**:783-789 (Nov.) 1958 [Philadelphia].

The author reports on a 23-year-old man with Ewing's sarcoma involving the tibia of the right lower extremity which was amputated. The patient survived 10 years despite the occurrence of 2 episodes of pulmonary metastasis. The first occurred 3 years after the amputation of the lower extremity and was treated successfully by surgical removal of the metastatic lesions from the lingula and the left lower lobe. The second metastasis occurred 4½ years later and was treated by intensive irradiation of the left hilar region. At the time of the writing of this report the patient was clinically and roentgenographically free of disease, 2½ years after the last episode. The case of this patient is believed to be the first reported of Ewing's sarcoma with metastases to the lung which were removed surgically. This is also the first case of a patient with recurrent pulmonary metastases who has survived 10 years.

Nineteen additional cases of histologically proved Ewing's sarcoma in patients who survived 10 years or more were collected from the English literature. There were no special features which characterized this group prognostically. In an attempt to arrive at a significant 10-year survival rate, only those reports in the literature dealing with more than 50 cases of Ewing's sarcoma were chosen; of a total of 370 patients, 15 survived 10 years or more, representing a 10-year survival rate of only 4%. This fact, however, emphasizes that the prognosis of Ewing's sarcoma is not uniformly hopeless. No report of death resulting from Ewing's sarcoma after 10 years was found in the literature, and most patients who died of recurrent disease died within 3 years. If patients survive this period, there is good statistical evidence that they will survive 10 years.

The cases of 6 patients with Ewing's sarcoma complicated by pulmonary metastases which regressed completely were collected from the literature. The metastatic lesions disappeared spontaneously in 3 of the 6 patients, and as a result of irradiation therapy in the other 3. Four of these 6 patients survived 10 years or more, while another is alive and well 7 years after initial therapy.

Diagnostic Significance of the Determination of Gases in the Blood of Patients with Atrial Septal Defect Alone or Associated with Other Cardiovascular Abnormalities (Study of 257 Cardiac Catheterizations). A. Bonelli and H. Hilke. Chir. torac. **11**:262-280 (June) 1958 (In Italian) [Rome].

The difference between the oxygen content of blood in the right atrium and that in the venae cavae was determined by intracardiac catheterization in 257 patients with atrial septal defect alone or associated with other cardiovascular abnormalities. Blood oxygen concentrations, measured by the manometric method of Van Slyke, were investigated in 203 patients for diagnostic purposes and in 54 patients for the purpose of postoperative follow-up. The average for the normal oxygen content of blood in the venae cavae was taken as 14.7 vol.%. The authors are in accord with Bing and co-workers in considering the incremental rate within 1.5 vol.% as the normal rate of increase in the oxygen content of blood in the right atrium as

compared with that in the venae cavae, that is, an increase of approximately 10 vol.% in the oxygen content of blood in the right atrium as compared with that in the venae cavae. Values of more than 1.5%, indicative of a diagnosis of atrial septal defect alone, were found in 154 patients (76%).

The rate of increase in the oxygen content of blood in the right atrium as compared with that in the venae cavae varied within the normal limits in 5 patients who had atrial septal defect associated with stenosis of the tricuspid valve. Cardiac catheterization was, therefore, diagnostically useless in these 5 patients. Cardiac catheterization had a diagnostic value in 2 patients who had atrial septal defect associated with stenosis of the mitral valve and in 2 patients who had atrial septal defect associated with ductus arteriosus, because the incremental rate exceeded the normal limit. Cardiac catheterization was useless for the purpose of differential diagnosis between the atrial septal defect alone or one associated with transposition of the pulmonary veins in 33 patients who had transposition of 1 pulmonary vein and in 6 patients who had transposition of 2 pulmonary veins. This method had diagnostic value in 4 patients with transposition of the pulmonary veins connected with the superior vena cava but without atrial septal defect.

A large atrial septal defect exceeding 5 cm. was found in 17 patients at operation. An increase to more than 20 vol.% in the oxygen content of blood in the right atrium as compared with that in the venae cavae was observed in 12 of the 17 patients (64%). Cardiac catheterization revealed that the rate of increase in the oxygen content of blood in the right atrium as compared with that in the venae cavae was within normal limits in about 40 of 54 patients who were operated on.

Refinements in Prevention of Recurrent Carcinoma Prior to and During Resection of the Colon and Rectum: Preliminary Report. M. E. Bacon and J. L. Berkley. J. Internat. Coll. Surgeons **30**:539-546 (Nov.) 1958 [Chicago].

The authors report on 1,760 private patients with carcinoma of the large intestine, 92% of whom were subjected to the routine procedure for excision of the descending colon, sigmoid, and rectum. Of these patients, 440 were operated on between 1949 and the end of August, 1958, by adding the technique of aortoiliopelvic lymphadenectomy to the routine procedure. The mortality rate was 3%, and the results of extended node dissection proved gratifying in that the 5-year survival rate of patients operated on for carcinoma of the rectum was increased from 53 to 59% and that of patients with carcinoma of the descending colon from 67 to 71%. The problem of recurrence by implantation of free carcinoma cells still prevents achievement of a survival rate proportionate to the surgeon's efforts. The question of the enema as a means of intraluminal spread is seriously considered.

Since March, 1958, Clorpactin XCB, a form of monoxychlorosene, was employed by the authors routinely in all radical resections for cure; 5 Gm. of this cancericidal agent in 1,000 cc. of sodium chloride solution (a 0.5% strength) was used for an enema 2 hours before the start of the operation, and intraoperatively the portion of the intestine containing the tumor was immediately covered with a thick pad saturated with Clorpactin XCB solution. Fifty cubic centimeters of the solution was injected into the lumen of the intestine between the ligatures, below the lower ligature and above the higher ligature, and remained in these areas until anastomosis was begun. Repeated irrigation of the peritoneal cavity with as much as 1,000 cc. of the solution had no harmful effects on the normal tissue and did not interfere with normal tissue growth or satisfactory wound healing. Sufficient time has not yet elapsed for a statistical report, but smears taken for cell study and chemical tissue reaction are being evaluated in cooperation with ancillary departments. More time and similar studies by other interested workers will be required to justify definite conclusions.

Implantation Metastases from Cancer of the Large Bowel. P. Boreham. Brit. J. Surg. **46**:103-108 (Sept.) 1958 [Bristol].

Boreham cites the history of a man who underwent a right-sided hemicolectomy for a growth partially obstructing the ileum. The terminal ileum and ascending colon were removed, and an end-to-end anastomosis of terminal ileum to transverse colon was made. The patient's recovery was uneventful. On the first anniversary of his operation he was readmitted with a hard lump in the muscles of the abdominal wall beneath the lower end of the paramedian scar. It proved to be a metastatic deposit in the scar. The lump decreased in size after high-voltage irradiation, but the patient died of numerous metastases 5 months later. It seems possible that the metastatic deposit arose from a fragment of carcinoma implanted into the wound at the time of operation. The studies described are concerned with the frequency with which such implantation metastases occur, with the manner of implantation, and with means for their prevention. If metastases occur in operative scars by implantation of cells from the peritoneal surface of an intestinal cancer, one would expect them to be seen around colostomies after perineoabdominal excision of the rectum, because it is usual to lead the specimen, with its lower end tied into a glove, out through a small wound in the left iliac fossa, before dividing the intestine above the growth to make the terminal colostomy. During this maneuver the

outer surface of the excised part containing the growth is wiped over the edges of the colostomy wound.

The author describes 2 cases which illustrate metastases possibly arising by implantation in this way. He has records of 5 other cases of recurrences around a colostomy, but in 2 of them the growth was very extensive locally; 2 others followed a Paul-Mikulicz type of resection where the possibility of contamination of the wound by intestinal contents cannot be excluded; and 1 other patient had 4 carcinomas of the rectum associated with familial polyposis coli, so that the tumor developing at the colostomy was very likely another primary carcinoma. The author also collected a number of cases of recurrences in the perineum after excision of the rectum for carcinoma, but he could not find a case where the recurrence could not have arisen owing to incomplete excision of local spread. He thinks that some perineal recurrences occur by implantation of cancer cells from the lumen of the intestine into the wound when spill is allowed to occur. Searching clinical and outpatient records for further implantation metastases in abdominal scars, he found only 7 other cases with tumors in scar tissue, and 2 of these proved to be nonmalignant. In only 3, and possibly 5, of 10 patients did contamination of the wound by the peritoneal surface of the growth seem to have given rise to implantation metastases.

Further evidence of this mode of spread was sought for in 3 ways: 1. Smears were taken onto a slide by rubbing the edge of it over the peritoneal surface of the specimen opposite the growth and especially where the peritoneum was puckered. These smears were stained mostly by Papanicolaou's method and were compared with smears similarly obtained from the peritoneal surface of the normal intestine and with smears made of mucus from within the intestine and with paraffin sections of the primary tumor. Fifty-two specimens were examined in this way, and the author was unable to detect any malignant cells in the smears taken from the serous coat of the intestine. 2. Sections were cut across the thickness of the intestinal wall through any point of peritoneal puckering or apparent ulceration opposite the growth. In 35 carcinomas of the large intestine arising above the peritoneal floor, 16 were found to show puckering, and in only 4 of them were malignant cells found ulcerating onto the peritoneal surface of the intestine. Granulation tissue and fibrin seem to proliferate on the peritoneal surface of the growth and prevent cancer cells from being shed into the peritoneal cavity or onto the wound or the surgeon's hands. This protective layer of fibrin and granulation tissue may be only a few cells thick. Therefore, the growth should be handled as little as possible, or it should be covered with a swab. By incorporating a thin sheet of malleable metal in the swab, it can be molded onto the growth by finger pressure, and thus damage caused by the tying of tapes can be avoided. 3. The author intended to use this technique and to compare the results with earlier series. He found so few recurrences in scars, except where the growth was advanced or gross contamination of the wound with intestinal contents occurred, that this was abandoned.

The author feels that he demonstrated conclusively that carcinoma of the large intestine does give rise to implantation metastases. These occur on the raw surfaces in the intestine below a growth, especially fistulas and wounds at the anus. They also occur on suture lines in the large intestine after resection of a growth unless precautions are taken to prevent this. Only one recurrence at the suture line by implantation has occurred since the instigation of routine irrigation of the intestine with perchloride of mercury below an occluding clamp before division. In this one case the clamp slipped, and there was gross contamination of the wound by intestinal contents.

NEUROLOGY & PSYCHIATRY

Electroencephalographic Changes During the State of Coma. C. Loeb. Electroencephalog. & Clin. Neurophysiol. **10**:589-606 (Nov.) 1958 [Montreal].

The author studied 25 selected patients affected with coma, from the clinical, electroencephalographic, and anatomic standpoints. With the use of signs and symptoms commonly found in comatose patients as parameters, the different degrees of coma were subdivided for practical purposes as follows: Of the 25 patients, 2 had impairment of consciousness, 14 had moderate coma, and 9 had deep coma. Concerning the type of electroencephalographic activity observed in these patients, 15 had generalized electroencephalographic changes characterized by continuous or intermittent activity, 7 had unilateral electroencephalographic changes characterized by continuous or intermittent activity, and 3 had focal electroencephalographic changes represented by isolated waves or short bursts, localized in a restricted area over one hemisphere. Postmortem examination of the brain was performed on 17 patients, and the site of the cerebral lesion was reconstructed on the basis of macroscopic and microscopic sections. Of the 25 patients, the meninges were the site of the cerebral lesion in 3; one cerebral hemisphere, in 15 (with impairment of cortex and white matter in 6, impairment of white matter and basal ganglions in 7, and impairment of cortex, white matter, and basal ganglions in 2); multiple lesions in both hempispheres, in 1; multiple lesions, involving white matter, basal ganglions, and brain stem, in 3; and diffuse lesions, including edema and vasoparalysis, in 3.

The electroclinical results show that a generalized, slow, organized activity is not necessarily the bioelectric expression of most of the patients afflicted with coma. No definitive relationships are found between degree of coma and type of electroencephalographic changes. Moreover, the possibility of eliciting a bioelectric response to stimuli does not appear to be related to the depth of coma. Many different anatomic, circulatory, functional, and metabolic changes may account for the type and distribution of the electroencephalographic activity during some states of coma in man. The possibility of finding some schematic and stable relationships between the state of consciousness and the electroencephalographic activity, as many other workers do, seems to be very difficult. It seems possible to affirm, in general terms, that with the exception of a few isolated cases, in which the downward progress of coma was accompanied by a corresponding aggravation of the electroencephalographic changes, the great majority of the patients showed electroencephalographic alterations similar to those recorded in patients with comparable anatomic lesions but without modification of the state of consciousness.

Conservative vs. Surgical Treatment of Cerebral Aneurysms. F. Benson. Neurology **8**:852-856 (Nov.) 1958 [Minneapolis].

Observations on 40 patients with angiographically proved intracranial aneurysms, who were treated at the San Francisco Veterans Administration Hospital from 1946 to 1956, are reviewed. The data shed some light on the long-term prognosis of conservatively treated intracranial aneurysms. Of these 40 patients, 17 are known to be dead, 14 are still living, and 9 have disappeared from the study group; 22 were treated surgically, and the remaining 18 patients either were treated conservatively or died before surgery could be performed. There were 8 deaths among those who were operated on and 9 deaths among those who did not undergo surgery, with 13 of the 17 deaths occurring in the critical period after onset of symptoms. Of the 4 deaths occurring a year or more after the original disease, 2 involved surgically treated and 2 conservatively treated patients. From the survival times of the 14 patients who are still alive, it again can be seen that the surgically and the nonsurgically treated groups are about equal, each having 6 cases with survival times of 1 to 11 years.

The statistics usually referred to in predicting the outcome of conservatively treated intracranial aneurysms are those of subarachnoid hemorrhage. This is a symptom complex, not a specific disease entity, and the prognosis varies with the etiological factor. If one excludes trauma, probably more than one-half of the cases of subarachnoid hemorrhage are due to rupture of an intracranial aneurysm. Even so, it is hardly accurate to consider the long-term prognosis of these two as equivalent. Many of the other causes of subarachnoid hemorrhage are chronic degenerative processes with an ultimately fatal outcome; for instance, bleeding into a tumor, blood dyscrasias, intracerebral hemorrhage, and heavy metal toxicity are all causes of subarachnoid bleeding with a generally poor prognosis. The statistics used at present to predict the outcome of conservatively treated intracranial aneurysms are weighted with prognostically unfavorable cases which are not aneurysms.

Most neurosurgical attacks on aneurysms are delayed 2 weeks or more after the initial hemorrhage, so this very sizable number of fatalities present in conservatively treated series does not appear in the surgically treated group. Thus, it becomes apparent that patients who survive long enough to undergo surgery have a far better prognosis than the group as a whole and brings into doubt the statistics providing that all bleeding aneurysms deserve surgical therapy. The author stresses that, when those patients who die in the early danger period are excluded, conservatively treated and surgically treated aneurysms have nearly the same prognosis. Some cases of bleeding intracranial aneurysms are best treated conservatively.

Pituicytoma, a Tumor of the Hypothalamus: Clinicopathological Report of a Case. L. Liss. A. M. A. Arch. Neurol. & Psychiat. **80**:567-576 (Nov.) 1958 [Chicago].

The author reports the history of a woman who at the age of 19 became amenorrheic and obese. Later, symptoms of diabetes insipidus, masculinization, hypothyroidism, mental changes, and, finally, epilepsy developed. The patient lapsed into coma, hypostatic pneumonia developed, and she died. The total duration of the disease was 11 years. Autopsy revealed that the tuber cinereum was enlarged; the upper part of the infundibulum and the floor of the third ventricle were thickened, dark gray in color, and hard in consistency. The posterior lobe of the hypophysis was atrophic and barely visible. Histological studies were made on the portions of the brain that appeared abnormal on gross examination.

There was evidence that the symptoms exhibited by this woman were caused by a neoplasm of the hypothalamus, which was well differentiated and histologically resembled neurohypophyseal tissue. In the tumor were found 3 types of pituicytes: the bipolar with homogeneous protoplasm (type 1A), the astrocyte-like (type 2), and the glomerular (type 4). Not present in the tumor were the bipolar pituicytes with granular protoplasm (type 1B) and the triangular variety (type 3). These histological characteristics suggested that the tumor originated in the upper part of the infundibulum and infil-

trated the hypothalamus. The normal satellite structures in the hypothalamus were replaced by the neoplasm. The neurosecretory neurons were not destroyed by the neoplasm and were apparently functioning. The "neurosecretory granules" were found in numerous nerve fibers of the hypothalamohypophyseal tract and were deposited in numerous Herring bodies in the hypothalamus and upper infundibulum. The persivascular structures formed by the pituicytes in the neoplasm are similar to those of the normal neurohypophysis. The posterior lobe of the pituitary is atrophic, a condition which may be caused by the functional replacement by the neoplasm.

The pituicytoma described here is a slow-growing and well-differentiated glioma which is formed by 3 types of the highly specialized glial elements of the neurohypophysis. The histological analysis proves that pituicytes are highly modified glial elements which even in a neoplasm may preserve their characteristic appearance. However, it should be stressed that positive identification of the tumor cell, as well as various cellular forms in the normal neurohypophysis, was made possible only by employing variants of the Hortega silver carbonate technique.

PEDIATRICS

Regarding the Stevens-Johnson Syndrome. C. Juntke. Arch. Kinderh. (no. 2) **158**:129-134, 1958 (In German) [Stuttgart, Germany].

Although the Stevens-Johnson syndrome (ectodermosis erosiva pluriorificialis) as regards location of efflorescence, the involvement of the mucosa, formation of crusts and scales, and tendency to recurrence differs somewhat from erythema exudativum multiforme, it is now generally regarded as the most severe form of this entity. The cause of these disorders is still unknown, and the nomenclature is not uniform. Baader in 1925, suggested the term "dermatostomatitis," and Wechselberg in 1954 recommended "polymorphic ectodermosis." This last term would include cutaneous manifestations in the form of erythema exudativum multiforme, the mucosal lesions in the form of pluriorificial ectodermosis, and the combination of both in the severe form of the Stevens-Johnson syndrome. The disease usually runs its course in from 3 to 5 weeks.

The author reports a 10-year-old girl in whom the severe form of the Stevens-Johnson syndrome began in an atypical manner, so that the diagnosis proved difficult. The girl appeared confused, very ill, with severe motor unrest and crying. Her face was bloated, and the eyelids, lips, and gingivae were severely swollen. The tips of the fingers were suffused with blood and swollen. There was a yellowish coating at the base of the tongue, and the whole body, but especially the trunk showed an exanthem of small, dark red spots that did not resemble erythema exudativum multiforme. At first the disorder was regarded as a sepsis with a fulminating purpura. Despite treatment with penicillin, Terramycin, blood transfusion, and infusion of calcium, new hematomas developed on the toes; then swellings and hematomas decreased, and the exanthem became paler. Several days later hemorrhages recurred on the hands and feet, the oral mucosa was inflamed, pains persisted, and there was no improvement. After that the picture changed to that of the severe Stevens-Johnson syndrome. Because antibiotic therapy had been largely ineffective, cortisone was now given, and rapid improvement followed. Cortisone produced the same favorable therapeutic effect in a 13-year-old boy who had pluriorificial ectodermosis with a tendency to recurrences.

Experiences with Prolonged Cortisone Therapy in Children with Nephrosis. H. Hanssler. Arch. Kinderh. (no. 2) **158**:110-121, 1958 (In German) [Stuttgart, Germany].

The author reports on 9 children with nephrosis who were treated with adrenocortical hormones. The children ranged in age from 2 to 7½ years. All had an accelerated erythrocyte sedimentation rate, reduction in the level of serum albumins, increase in the alpha$_2$ and beta globulins in the presence of increased cholesterol values, severe proteinuria, occasionally slight urinary excretion of erythrocytes, and normal blood pressure values. Edema existed in all patients. Only cortisone or prednisone was used for hormone therapy, never corticotropin. Antibiotics were always given in addition to the adrenocortical hormones. Some of the children had received thyroid hormone before onset of the cortisone therapy, and some received both hormones together. The diet was high in proteins and carbohydrates but low in sodium chloride, and the intake of fluid was restricted. The body weight, the intake of food and fluid, and the urinary excretion were controlled daily. Factors checked at longer but regular intervals included the total plasma protein content, levels of serum proteins and serum cholesterol, erythrocyte sedimentation rate, protein content of the urine, urinary sediment, and blood pressure.

These children were observed for from 5 months to 4½ years. It was found that short-term hormone therapy was ineffective, but with the prolonged use of hormones all except 2 of the children achieved remissions. Seven of the 9 patients were free from symptoms at the termination of the hormone therapy. The size of the dose and the duration of treatment with adrenocortical hormones were decisive. Prednisone was given in dosage of 3 mg. per kilogram of body weight daily for at least 2 or 3 weeks. The dose was next reduced to 2 mg. per kilogram of body weight for about 3 weeks, and

then to 1 mg. per kilogram of body weight. The maintenance dose, after 8 or 9 weeks of treatment, was 10 to 15 mg. of prednisone per day.

Generally edema and proteinuria disappear first, and this is followed by normalization of the erythrocyte sedimentation rate, whereas dysproteinuria and high serum cholesterol values may be present several weeks longer. Normalization of these values does not insure cure of nephrosis, and it appears advisable to continue maintenance therapy for several months after normalization of the cholesterol and protein values. Secondary effects in the form of moon-face, generalized obesity, and secondary increase in blood pressure must be accepted, the more so since these effects usually subside after discontinuation of the hormone therapy. Simultaneous antibiotic therapy is recommended. The favorable effects of hormone therapy are restricted to nephrosis without nephritic components.

An Epidemic of Abacterial Meningitis. K. Nissler and A. Regitz. Arch. Kinderh. (no. 2) **158**:121-128 1958 (In German) [Stuttgart, Germany].

During the summer and fall of 1956 an epidemic of meningitis of obscure etiology occurred in many cities and towns of central Europe. The incidence was especially high in Magdeburg, where 254 children and 251 adults were hospitalized with this form of meningitis in the course of 6 months. The largest number of an estimated 5,000 patients received ambulatory or no treatment. Among the children the male-female ratio was 1.4:1. Headache was the most constant symptom, whereas nuchal rigidity occurred in only 36% of the patients, and vomiting in 74%. Increase in temperature was sometimes absent, but it frequently rose to above 39 C (102.2 F). Defervescence usually occurred by the 6th day. Nineteen per cent of the children had morbilliform and petechial exanthems. The cerebrospinal fluid generally showed only a slight increase in protein content, but its cell count was frequently high (over 10,000 per cubic millimeter). Neither encephalitic symptoms nor other aftereffects were observed. The headaches usually disappeared after the lumbar puncture. Except for bed rest, no treatment was given or was necessary. Studies by Professor Pette at the Research Institute for Infantile Paralysis indicated that this disorder was an infection with Coxsackie virus, group A.

OTOLARYNGOLOGY

Primary Rhinopharyngeal Tumors in Children. A. Correa and L. Paiva. Rev. hosp. clín. **13**:363-370 (Sept.-Oct.) 1958 (In Portuguese) [São Paulo].

Twelve children, ranging in age from birth to 12 years, with rhinopharyngeal tumors were observed during a period of 10 years at the Otorhinolaryngologic Clinic of São Paulo University. The type of tumor in 5 cases was an angiofibroma; in each of the other 7 cases it was a chondroma, a carcinoma, a lymphoepithelioma, an endothelioma, a myxosarcoma, a myosarcoma, and a fibrosarcoma. Diagnosis of the type of tumor was made by biopsy and by clinical, neuro-otorhinolaryngologic, and roentgen-ray examinations. It was observed that angiofibroma and chondroma are tumors of slow development, which produce chronic nasopharyngeal obstruction and frequent nasal hemorrhages. They are elastic on touch, do not metastasize, and produce deformation of the patient's face as they progress into the maxilla and the orbit. Roentgenographically, the benign tumors appear encapsulated, expansive, and nondestructive. They are amenable to surgical removal, with recovery of the patient. Malignant rhinopharyngeal tumors terminate after a very rapid development in the patient's death. They rapidly involve the structures and nerves at the base of the cranium, the orbit, the palate, and the cervical lymph nodes. The commonest early symptoms are headaches, visual, auricular, and nasosinusal disorders, and trigeminal neuralgia. Roentgenotherapy and chemotherapy may or may not produce slight transient improvement in the patient's condition.

The life span of patients with carcinoma is shorter than that of patients with sarcoma. The span is likewise shorter in patients with tumors involving the nerves at the base of the cranium than in those in whom the tumor grows into the nasal fossa and the oropharynx. The younger the patient, the more rapid and the more severe the course of the disease. In the cases reported by the authors, the 6 patients with benign tumors recovered after surgical removal of the tumor, after roentgenotherapy, and after testosterone therapy. The 6 patients with malignant tumors died within 1 to 6 months after the appearance of nervous symptoms. Autopsy showed multiple metastases and the invasive and destructive character of the tumors as they involved the structures and nerves at the base of the cranium.

Toxoplasmosis and Congenital Deafness. G. Kelemen. A. M. A. Arch. Otolaryng. **68**:547-561 (Nov.) 1958 [Chicago].

The author comments on the global distribution of toxoplasmosis and on the fact that, on the basis of reactions to Toxoplasma antigen, it exists in from 30 to 60% of some urban populations. The causative agent, Toxoplasma gondii, is a protozoan parasite, of crescentic shape, 7μ in length and 2 to 4μ in width. Every warm-blooded animal can be infected with it. It is transmitted in the form of a low-grade infection to the offspring; it may be acquired during adult life and need not be fatal. From human lesions animals can be reinfected. Higher incidences of

toxoplasmosis than in normal populations have been reported in patients with mental disease, particularly in those with Mongolism (as high as 75%). The discovery of advanced toxoplasmosis in the newborn infant suggests that the mother acquired the disease during or before pregnancy. The embryopathy caused by toxoplasmosis may result in stillbirth or prematurity, although the mother generally presents no symptoms of the disease. Transplacental infections occur through maternal leukocytes, with or without lesions to the placenta itself. Congenitally infected children most often show lesions limited to the central nervous system. Eye lesions are characteristic. Reports on involvement of the ears are rare.

The author reports 2 infants, one of whom was hospitalized 2 weeks after birth and died 10 days later, and the other was a stillborn boy. The autopsy reports and the histological studies on the ears of these infants are described in detail. In the first child the parasite was demonstrated, and in the second toxoplasmosis was indicated by general pathological signs. While in the ear the skeletal elements and the sensory end-organs were found to be in an adequate developmental stage, conspicuous changes were found in the soft tissues, mesenchyme, and mucoperiosteum. In the first case, with calcium deposits in the brain, similar formations showed up in the spiral ligament, predominantly in the vascular stria. Analysis of the changes pointed to an irritative state, running the whole scale from engorgement to organizatory products. Every sign reached its acme in the niche of the oval window.

Infantile toxoplasmosis is known to make a first-line attack on the central nervous system, and the author feels that it is one of the hitherto undisclosed sources of congenital hearing defects. Toxoplasmosis being present in an overwhelming segment of the population of all climates, the elucidation of its role in congenital deafness requires a large-scale investigation at the pathological and the clinical level.

Stapes Mobilization: Analysis of Results in 250 Operations. E. H. Campbell. A. M. A. Arch. Otolaryng. **68**:663-672 (Dec.) 1958 [Chicago].

Advances in the operative technique of stapes mobilization have proceeded through logical steps from Rosen's original method which attempted mobilization at the stapes neck, through the method of pressure on the incus, various maneuvers at the stapes head, and finally to various kinds of manipulations of the stapes footplate. Numerous operators reached the conclusion that more successful mobilization can be accomplished by manipulations of the footplate and taking care to avoid dislocation of the incudostapedial joint and fractures of the crura. There is now general agreement that manipulations of the footplate with avoidance of crural fractures and dislocation of the incudostapedial joint give the best chances for successful results. The author presents an analysis of results obtained in 250 stapes mobilization operations.

The technique employed, in the great majority of the cases, was a pulsating pressure applied alternately to various parts of the stapes footplate, and the incus, and to the head of the stapes. The results were judged largely on the basis of improvement of hearing to the 30-db. level or better and the improvement to or near the level predicted on the basis of the preoperative bone conduction. In 11 patients, or 4.4% of the 250 cases, the improvement of hearing has reached to practically the normal line (an average of less than 7-db. loss to the speech frequencies). In 120 additional patients, or 48% of the 250 cases, the hearing was improved to the 30-db. level or better. A serviceable hearing level was thus obtained in 52.4% of the cases. Mobilization was as successful in patients over 55 years of age as in those between 20 and 30. Fifteen patients, or 6%, obtained an improvement of 15 db. or more, and in 7 of these the hearing was improved to the preoperative prediction level.

In 21 patients, or 8.4% of the 250 cases, the hearing was made worse by the operation. Most of these were worse by less than 10 db. The loss of hearing after operation appeared to be caused chiefly by fractures of the crura and dislocation of the incudostapedial joint in nearly all the cases. Mobilization was unsuccessful for the following reasons: (*a*) incomplete or partial loosening of the footplate; (*b*) fractures of one or both crura; (*c*) dislocation of the incudostapedial joint; (*d*) advanced diffuse otosclerotic stapes fixation; (*e*) anomalies of the conduction mechanism; and (*f*) adhesive formations in the middle ear.

A revision of the mobilization was carried out in 12 patients in whom the mobilization was apparently incomplete; 4 of these revisions were entirely successful, and 3 additional ones were partially successful. The fenestration operation was performed on 43 of the 112 patients who had been mobilization failures. Thirty-four (or nearly 80%) of these operations have been entirely successful, and 5 have been partially successful. Complications have been of a minor nature, consisting of prolonged dizziness or sense of unbalance, occasional perforations of the tympanic membrane, and in 2 cases secondary middle-ear infections.

The Surgical Treatment of Chronic Suppurative Otitis Media. H. L. Williams. A. M. A. Arch. Otolaryng. **68**:574-586 (Nov.) 1958 [Chicago].

Williams of the Mayo Clinic criticizes the suggestion made by Ballance that radical mastoidectomy with skin grafting should be done in any case

of chronic suppurative otitis media. He based this opinion on an analogy to chronic osteomyelitis of other bones. The author shows that the analogy to chronic osteomyelitis of long bones is inexact, and holds good only in the rare instances of chronic disease of the petrous apex. Ballance did not distinguish cases of perforations and simple mucoid discharge from cases of bone disease and cases in which cholesteatoma was the basis of the suppuration. Wittmaack by his theory of pneumatization provided further grounds for the tendency to operate on all types of chronically draining ears, since he suggested that the small-celled and eburnated mastoids with their pathological mucosa were doomed to continued suppuration. As a result, radical mastoidectomy was advised in cases in which the procedure added but little to the well-being of the patient. In an attempt to solve this problem, Lillie presented a classification of chronic suppurative otitis media in 1928, which, although modified from time to time, is still in use at the Mayo Clinic.

The present version of the classification into 3 types is presented, and it is pointed out that chronic suppurative otitis media of types 1 and 2 does not justify mastoidectomy. In the third type the perforation of the tympanic membrane is usually marginal, and evidence of serious bone disease and usually of cholesteatoma is present. In this type clinical judgment is needed. If signs of impending complications, such as pain in the head which awakens the patient from sleep, vertigo when the fistula test gives a positive result, recurring septic fever, and the like, are noted, the need for surgical intervention is obvious. The author and his colleagues have found, however, that, even with the presence of cholesteatoma, a number of these patients get along well under local medical treatment alone.

Commenting on perforations of the drumhead and on cholesteatomas, the author discusses literature reports and then points out that before introduction of the sulfonamides and antibiotics almost half of the patients with chronic suppurative otitis media seen at the Mayo Clinic had widespread destruction of the membrana tensa, with disease or scarring of the mucosa of the middle ear and cholesteatoma involving the attic, antrum, and mastoid. Lately, however, this condition is rarely seen, and the majority of patients have superior perforations leading into the attic. For the past 20 years the Bondy modification of the radical mastoidectomy was done at the Mayo Clinic. In this connection the author shows that nothing is to be gained by the preservation of the matrix of the cholesteatoma, and that in recent years he has removed this matrix. Bondy's operation combined with the Lempert flap has given excellent results. The discussions of the operative treatment for chronic mastoid bone disease in children and of operations for nonotosclerotic conduction deafness are followed by illustrative case histories, which indicate that improvement in hearing, in addition to healing of the suppurative process, can be obtained in ears that might have been subjected previously to a classic radical mastoidectomy. Attention is directed to the importance of closure of perforations, preservation of remnants of the tympanic membrane, and replacement of the destroyed drum with a skin graft when indicated. The newer outlook on chronic suppurative otitis media has so influenced surgical technique that the so-called classic radical mastoidectomy is not indicated except in those instances in which hearing has been lost either through physiological closure of the round window by scarring or because disease has invaded and destroyed the cochlear portion of the labyrinth.

THERAPEUTICS

Treatment of Hypertension with a Combination of Chlorothiazide and Mecamylamine. A. J. Barnett and R. J. Marshall. M. J. Australia 2:521-524 (Oct. 18) 1958 [Sydney].

The value of ganglion-blocking drugs in the treatment of hypertension is limited by variability in absorption when they are given orally and by the occurrence of the unpleasant side-effects of parasympathetic ganglionic blockade. Mecamylamine represents an advance over the quaternary ammonium compounds in that it is well absorbed from the gastrointestinal tract. However, parasympathetic side-effects are no less troublesome than with the methonium drugs, and in high dosage there is a considerable incidence of diarrhea and even of necrosis of the large intestine. Since preliminary reports suggested that chlorothiazide, a new diuretic compound, enhances the activity of ganglionoplegic drugs, the authors decided to investigate the combined use of mecamylamine and chlorothiazide. Fourteen patients, all with essential hypertension, were admitted to the trial. One was a child, aged 6 years, who had previously undergone operation for suspected unilateral renal disease; the remainder, 7 men and 6 women, were aged from 36 to 63 years. In 5 of the patients malignant hypertension had been proved several years previously by the presence of papilledema. All 5 had been treated with mecamylamine for periods of 2 to 15 months before the present trial commenced, and a stable dosage had been achieved. Other patients were receiving reserpine or hydralazine. These drugs were continued, with one exception, without modification throughout the trial.

The trial confirmed the potentiating effect on the action of ganglion-blocking drugs in hypertension. During the 4-week period the dose of mecamylamine was gradually reduced in 13 of the 14 patients by approximately 50%, without any loss of the con-

trol of blood pressure. The diminution in requirement of mecamylamine was accompanied by decrease in most of the symptoms attributable to parasympathetic ganglionic blockade, with the exception of dryness of the mouth, which was sometimes unchanged or even worse; it seems that the effects of mild dehydration induced by chlorothiazide may counterbalance the benefit from reduced dosage of mecamylamine. The potentiating effect of chlorothiazide was noted within 2 or 3 days. Several patients showed severe postural hypotension at this time. The fall in body weight occurred within the first week. The effect of chlorothiazide disappeared soon after the drug was withdrawn. In one patient severe headaches from uncontrolled hypertension developed 3 days after the end of the trial.

Estimations of electrolyte levels should be made at intervals during prolonged treatment, especially in patients with renal impairment, to guard against possible serious derangements. It seems unwise to give more than 1 Gm. of chlorothiazide daily and unnecessary to restrict dietary sodium intake. No toxic effects have been reported. The mode of action of chlorothiazide as a hypotensive agent has not yet been fully elucidated, although its major effect probably occurs through a reduction in plasma volume secondary to loss of salt and water. Its efficacy in enhancing the potency of ganglion-blocking drugs, permitting the latter to be used in lower dosage with less unpleasant side-effects and dangerous complications, is established.

A Comparative Evaluation of Certain Methods of Vaccine Therapy in Brucellosis. T. L. Bereznyakova. J. Microbiol. (Translation from the Russian) (no. 9-10) **28**:1229-1233, 1957 [New York].

A polyvalent bacterial vaccine, consisting of heat-killed Brucella organisms, was given by 3 routes to 335 patients with brucellosis. The vaccine was administered subcutaneously to 107 patients, intravenously to 183, and intracutaneously to 45. Most of the patients were between 21 and 50 years of age. The disease had developed in the digestive tract of approximately two-thirds of the patients, and it was attributed to the patients' occupation [such as the herding of cattle] in the others. The chronic phase of the disease was present in 255 patients (76.42%). Joints, central or peripheral nervous system, and internal organs were involved in descending order in a number of patients affected. The subcutaneous method of vaccination was not well tolerated, and it was abandoned in 1951. The best results were obtained with the intravenous method, the vaccine being administered daily in 2 or more doses at intervals of 1½ to 2 hours. The optimum dose consisted of a solution containing 100,000 killed bacterial cells. Administration of divided doses permitted decreasing considerably the overall dosage. The best therapeutic effect and the least frequent recurrences were related to the 2-part intravenous administration of the vaccine. There was a rapid restoration of body temperature to normal after 4 or 5 intravenous injections, whereas this effect did not develop with the other 2 methods until after 8 to 12 injections. Improvement in the general condition and subsidence of joint pains and other symptoms took place more rapidly with the intravenous method (usually after a few days of therapy) than with the other 2 methods. The only complication ascribed to the intravenous route was the exacerbation of a preexisting state of nephritis in one patient. The intracutaneous route may be used only in selected instances in which it is desirable to avoid the generalized postvaccinal pyretic reaction.

Catastrophic Drug Reactions. L. E. Prickman. Minnesota Med. **41**:751-753 (Nov.) 1958 [St. Paul].

Frightening experiences with severe status asthmaticus, which followed the inadvertent administration of acetylsalicylic acid (aspirin) to patients with asthma and nasal polyps who were sensitive to this drug, led to a careful questioning of each patient about this and other drug hypersensitivities. When the history of any drug allergy was obtained, the author promptly stamped the words "drug allergy" on all parts of the patient's records to alert all concerned not to administer this particular agent; this device worked extremely well. Then, as allergic sensitivity to sulfonamides, penicillin, and many other new drugs was encountered, the Mayo Clinic history records were revised to provide a special space in which to record the presence or absence of any known drug allergy and the type and severity of the reaction. This same information about drug allergy was also recorded on cards referring the patient to the hospital in order to alert surgeons, anesthesiologists, nurses, and the staff generally, so that the offending medicament would not be administered. Similar precautions were taken with contrast mediums and anesthetic agents.

A careful history will not reveal all potential allergic reactions; nor are reliable tests available for the detection of all drug hypersensitivities. Case histories are presented to illustrate this, and a survey on severe reactions to antibiotics is cited. The physician must be ready at all times to treat allergic drug reactions quickly and effectively. Fortunately, the agents most needed to cope with such emergencies are to be found in most physicians' bags. Unfortunately, these agents are not always assembled and immediately available in hospitals and clinics. Therefore, emergency sets have been prepared to combat anaphylaxis. These sets are placed in strategic locations in clinics, hospitals, and research departments where one is most

likely to encounter anaphylactic reactions. The sets contain two 1-ml. ampuls of epinephrine (1:1,000), two ampuls of aminophylline (3¾ grains [0.25 Gm.] each), one 1,000-ml. bottle of 5% dextrose in distilled water, one 10-ml. ampul of diphenhydramine (Benadryl) hydrochloride (10 mg. per milliliter), and one bottle of hydrocortisone (100 mg.), together with various syringes, long and short needles, scalpel, hemostat, suture material, alcohol, sponges, and a set for the intravenous administration of fluids. Oxygen (tank and mask) is also important and is readily available in clinics and hospitals. Most reactions encountered are mild and respond to injections of epinephrine and oral therapy with antihistamines. Penicillinase, an enzyme that promptly neutralizes penicillin in vivo, is also available but has not been tested by the author. Because it is said to have sensitizing potentialities, its use perhaps should be reserved at present for major reactions to penicillin until its safety can be further studied.

PATHOLOGY

A New Method for Blood Cell Counting. I. E. Roeckel. Bull. Georgetown University Med. Cent. **12**:60-61 (Nov.) 1958 [Washington, D. C.].

In an attempt to find a reliable but more rapid means of counting both red and white blood cells, an electronic counter was substituted for the technician's hand at the Georgetown clinical laboratory. The counter used is based on the principle that blood cells are poor electrical conductors in comparison with a sodium chloride solution, thus allowing a controlled electric current to distinguish them. The procedure for the white blood cell count is as follows. A predetermined, optimal dilution of blood is made in isotonic sodium chloride solution; the red blood cells are completely disintegrated with the aid of a stromalizing agent and placed in a beaker. Through an aperture exactly 0.5 cc. of the blood cell suspension is drawn while the electric current flows from the positive to the negative electrode. The blood cells passing through the aperture interrupt this flow of current, and these interruptions are counted by a high-speed electronic computer. At the same time the electric impulses resulting from the individual blood cells are displayed on an oscilloscope screen directly visualizing the counting process. This permits a continuous check on the performance of the machine. The absolute number of white blood cells counted by the machine is shown on the computer and for a normal leukocyte count is about 20,000 blood cells as compared with a hand count of about 20 blood cells. The absolute number of white blood cells counted as well as the simple diluting technique accounts for the greater accuracy. Red blood cells are counted in a similar manner, omitting the stromalizing agent and increasing the dilution with sodium chloride solution. Four months' intensive use of the electronic counter has shown the instrument to be reliable, accurate, and efficient, as well as economical.

A Study of the Adrenal Status in Hypertension. A. H. Shamma, J. W. Goddard and S. C. Sommers. J. Chron. Dis. **8**:587-595 (Nov.) 1958 [St. Louis].

The role of the adrenals in essential hypertension is still controversial. The weights, lipid content, and structural abnormalities of the adrenals were studied in 78 hypertensive patients who had undergone a therapeutic unilateral or bilateral adrenalectomy, and also in 220 hypertensive patients examined at autopsy. The findings were compared with those from 220 normotensive patients who came to autopsy. Adrenocortical adenomas were found in 45 (20%) of 220 autopsied cases with hypertension. There were 16 true adenomas (21%) among the 78 adrenalectomy specimens. In the control series adenomas were present in 4 (1.8%) of 220 cases. Thus, adrenocortical adenomas were 10 times more frequent in hypertensive than in normotensive persons.

Only 3 of the 61 adenomas were recognized clinicopathologically as functional tumors of etiological importance in hypertension, with aldosterone hypersecretion. In most adrenalectomy specimens from patients with essential hypertension, cell counts demonstrated no hints of hyperactivity of either zona glomerulosa or zona fasciculata. In fact, the glomerulosal cells instead were relatively close-packed, with an inferred hypoactivity of the type observed to occur when the intercellular fluid is comparatively rich in sodium. From the viewpoint of these cell counts, corticoids are not likely to be implicated in causing human essential hypertension. Medullary hyperfunction of adrenal glands in hypertension could also not be inferred from the present observations. Failure to demonstrate significantly increased adrenal weights accompanying hypertension does not necessarily exclude an overgrowth of one component of this compound endocrine gland at the expense of others. If adrenocortical adenomas, cortical nodules, and nodular cortical protrusions are all regarded merely as different manifestations of adrenocortical overgrowth, then more than 80% of adrenalectomized or autopsied hypertensive cases had excessive cortical growth, compared with about 44% of the control cases. Adrenal weights, lipid content, venous wall thickness, and other morphologic aspects investigated were not significantly different in the hypertensive and control series. The authors feel that more refined methods of analyzing the various adrenal components would be necessary to establish the importance of adrenocortical tissue growth activity accompanying hypertension.

Skin Fragments Removed by Injection Needles. T. Gibson and W. Norris. Lancet **2**:983-985 (Nov. 8) 1958 [London].

The authors investigated the incidence, the cause, and the possible fate of skin fragments cored out when a hollow needle is thrust through the skin. Portions of skin and subcutaneous tissue were obtained at autopsy or from surgically excised material. All needles in the range commonly used for intravenous injections—from the standard needle (18 gauge) included in the set used by the blood transfusion service to a no. 16 hypodermic needle (24 gauge)—were tested. Some needles removed fragments of skin at each thrust, others only sporadically. Of 300 tests with all needles, fragments of skin were removed in 207 (69%). No difference was noted between new and resharpened, open-ended needles, nor did the various needle sizes make any difference as to the number of skin fragments removed. The size of the skin fragment was roughly proportional to the size of the lumen. Needles with a closed end (side-opening needles and those with a fitted stylet) did not remove skin fragments. The fact that no harmful effects have been previously attributed to skin emboli suggests that little is to be feared from that source. With more widespread awareness, the high incidence of detached portions of skin may be correlated with pathological processes. The risk of infection, subcutaneous, intramuscular, or pulmonary, calls for care in skin preparation before injection.

PHYSIOLOGY

Fatal Effects of Heat on Man. M. A. Haseeb and F. Amin. J. Trop. Med. **61**:280-281 (Nov.) 1958 [London].

The disaster reported occurred in the Sudan Republic in February, 1956, when 281 prisoners were confined in a prison ward of a dimension ordinarily alloted to 16 soldiers. The prisoners entered the ward, measuring 19 to 5.5 meters (about 60 by 17 ft.) and 3.8 meters (12 ft.) high, at 7:30 p.m. after an exhausting 8-hour journey in trucks on a day when the maximum temperature was 103.8 F (40 C). They probably had very little to eat and drink during the previous 24 hours. On opening the ward in the morning, 187 persons were found dead, and 11 persons were seriously ill with shock, thready pulse, and vomiting. Two of the 11 died on the way to the hospital, and 5 others died on the day of admission. All 9 persons who arrived at the hospital had hyperpyrexia, with an average temperature of 102 F (38.9 C), thready pulse, sunken eyes, dry lips, dry wrinkled skins, and sighing respiration, and were either comatose or semicomatose and in a state of muttering delirium.

The 83 prisoners who survived and were not hospitalized revived like "fish put back into a stream" when buckets of water were poured on their bodies. Vomiting was such a marked symptom of the sick that the police suspected poisoning. The experiences of the prisoners were described as follows: "Within one hour of being locked in, everyone felt uncomfortably hot, so much so that they stripped off almost all their clothes. Throbbing headache, palpitation, nausea, and a feeling of extreme fatigue and helplessness supervened. They became giddy and unable to stand or even to move their limbs. Sweating was so profuse and persistent that the floor of the ward was flooded. There was a feeling of impending death and the people started shouting for help but their voices were faint and inaudible. Collapse and death followed." Postmortem examinations were performed on 4 bodies: The eyes were open, the eyeballs depressed, and the lips dry; the skin and muscles were extremely hard to cut; all the internal organs looked pale and felt as hard as wood; there were no specific pathological lesions in any organ. This extreme example of the effect of heat on the human body is reminiscent of the "Black Hole" of Calcutta during the revolution in Bengal in June, 1756, when 146 Englishmen were arrested and confined in the punishment cell of the Fort, a room about 18 by 14 ft. with only one small window. Only 23 of them came out alive.

BIOCHEMISTRY

The Ionized, Complexed, and Protein-Bound Fractions of Calcium in Plasma: An Investigation of Patients with Various Diseases Which Affect Calcium Metabolism, with an Additional Study of the Role of Calcium Ions in the Prevention of Tetany. A. Fanconi and G. A. Rose. Quart. J. Med. **27**:463-494 (Oct.) 1958 [London].

There are 3 main forms in which calcium may appear in the plasma: ionized, protein-bound, and complexed. In this report the term "complexed" refers to that fraction of calcium which is ultrafilterable but not ionized. Most of this calcium is complexed to small diffusible molecules, the chief of such molecules being citrate. The only accepted method of determining the ionized calcium of plasma has been the biological method of McLean and Hastings, which uses the frog heart as an indicator for calcium ions. Unfortunately in patients with pathological conditions unknown substances may be present in the plasma, or known substances may be present in abnormal concentration. In particular, magnesium ions or organic acids may be present in abnormal concentration and may affect the frog heart.

A purely chemical method which permits the determination of ionized and ultrafilterable calcium in human plasma was described by Rose in 1957.

It is not susceptible to the hazards of the biological method. This method, with certain modifications, was used by the authors who report the results of 66 determinations of plasma-ionized, of plasma-complexed, and of total plasma calcium in 7 normal men and in 37 patients with pathological conditions affecting calcium metabolism. In normal men the total plasma calcium content ranged from 9.17 to 10 mg. per 100 cc. In primary hyperparathyroidism the level of plasma-ionized calcium was high, whereas in secondary hyperparathyroidism it was normal or low. There was some evidence that in primary hyperparathyroidism the binding of calcium by plasma proteins is lower than might be expected. This explains why some patients with parathyroid adenomas have normal levels of total plasma calcium. As was expected, the plasma-ionized calcium was diminished in hypoparathyroidism.

In 2 of 3 cases of uncomplicated nephrotic syndrome, the level of plasma-ionized calcium was normal, the diminished concentration of total plasma calcium being entirely due to a decrease in the protein-bound fraction associated with a low level of plasma albumin. In the third case, the ionized fraction was diminished. In patients with untreated renal glomerular osteodystrophy, the level of plasma-ionized calcium was low or normal; this value is a good guide for controlling the dose of vitamin D required to heal bone disease. In 2 untreated cases of renal tubular rickets and osteomalacia, the level of plasma-ionized calcium was normal; there was no tendency to a low level of this form, as implied by other workers. In steatorrhea the level of plasma-ionized calcium was low in patients in whom it was suspected that osteomalacia was developing.

Overbreathing in normal subjects was followed by a decrease in the plasma-ionized calcium. Nearly half of this decrease was due to an increase in the plasma-complexed calcium, the remainder being due to an increase in calcium bound to plasma protein. Four patients were investigated who had chronic signs of tetany or pretetany in the presence of normal plasma electrolytes. All had normal plasma calcium fractions and showed a normal decrease in the ionized fraction after overbreathing.

There was evidence that in cases of renal failure with hypocalcemia, but without tetany, the absence of tetany is not due to acidosis alone. Protection must sometimes be due mainly to some other factor, which may be an increase in plasma magnesium. In hypoparathyroidism tetany occurred when the plasma-ionized calcium fell below a critical level of approximately 4.3 mg. per 100 cc., provided that there were no other complicating factors. The level of plasma-complexed calcium was high in alkalosis from overbreathing, and in renal failure when the blood urea exceeded approximately 100 mg. per 100 cc. It was normal, however, in primary hyperparathyroidism uncomplicated by severe renal failure. In the absence of marked renal glomerular damage the urine calcium appeared to be related closely to the plasma-complexed calcium. There is some evidence that there are 2 immediate causes of the high level of urine calcium in idiopathic hypercalcinuria. Either there is an excess of complexed calcium in the plasma, or else there is a diminished renal tubular reabsorption of a complex of calcium.

The Normal Range of Transaminase Levels. G. L. Reyes. J. Philippine M. A. 34:537-540 (Sept.) 1958 (In English) [Manila].

The author determined the levels of glutamic oxalacetic transaminase (GO-T) and glutamic pyruvic transaminase (GP-T) in blood samples obtained from 200 adult Filipinos, 150 men and 50 women, between the ages of 18 and 42 years. The serum transaminase values ranged from 5 to 38 units for GO-T and from 3 to 29 units for GP-T, with mean or average values of 13.84 ± 6.63 and 14.78 ± 6.06 Sigma Frankel units respectively. Comparison of the difference of the mean values of serum and plasma and the standard error of the difference between the two mean values for each type of transaminase showed that the results obtained for serum and plasma were statistically significant, and, therefore, serum and plasma cannot be used interchangeably in determining GO-T and GP-T values.

PUBLIC HEALTH

The Problem of the Dissemination of Poliomyelitis Virus in the Environment of the Patient Between Epidemics. E. S. Zalmanzon, R. S. Rappoport, F. G. Itselis and A. F. Talinskaia. Probl. Virol. (no. 5-6) 2:348-353, 1957 (Translation from the Russian) [New York].

At the Urban Public Health and Epidemiologic Station in Moscow, the authors studied the problem of determining the degree of dissemination of poliomyelitis virus in the environment of patients between epidemics. Seven hundred twenty-one persons who had been in contact with poliomyelitis patients under various environmental conditions from January to May, 1956, were examined for virus. In 15 of 45 various locations (14 nurseries, 5 kindergartens, 2 schools, and 24 domestic environments), a total of 37 strains of poliomyelitis virus were isolated; 20 of them were type 1, 7 were type 2, and 10 were type 3. Type 1 virus was found in 7 locations, type 2 in 3, and type 3 in 5. This makes it probable that during the winter and spring of 1956 there were sporadic cases of poliomyelitis in Moscow, since during epidemic outbreaks one type is predominantly isolated, usually type 1 virus. Only untypable cytopathogenic agents were found in 6 environmental locations, and the virus was not

found in 24. If, of the 721 persons only the 358 in the 15 locations in which poliomyelitis virus was isolated are considered, then its dissemination in the environment of patients amounts to 10.3% (37 strains from 358 persons investigated).

The virus was isolated in 10% of infants up to 3 years of age, in 1.3% of children from 3 to 7, in 1.9% of children from 7 to 15, and in 0.5% of persons over age 15. Untypable cytopathogenic agents were found exactly twice as frequently as poliomyelitis virus. The percentage isolation of poliomyelitis virus in the environment of patients was significantly lower in this investigation than in previous ones. This could depend on 3 causes. 1. The present investigation was not carried out during an epidemic, but, was made while the dissemination was at its lowest intensity. 2. Cultures of human embryonic tissues were used, which are less sensitive to poliomyelitis virus than are the cultures of HeLa cells or of monkey kidney tissues used by other authors. 3. The amount of fecal suspension added to the culture medium varied from 0.1 to 0.2 cc.; the percentage of isolations of the virus might possibly have been raised by increasing the amount of introduced material. The authors found a greater dissemination of poliomyelitis virus in children's institutions, particularly nurseries, than in a family environment. Type 3 poliomyelitis virus was discovered for the first time within the Soviet Union.

Organization of the Treatment of Tuberculous Meningitis in Czechoslovakia and Results. L. Kladivova, V. Vojtek and F. Sykora. Arch. franç. pédiat. (no. 7) **15**:941-946, 1958 (In French) [Paris].

The authors present precise data concerning all the children in Czechoslovakia, up to age 15 years, who were afflicted with tuberculous meningitis between January, 1954, and December, 1956. These data were collected from 5 state centers for treatment of the disease, each of which was responsible for the results of early and late treatment of every case of meningitis in the region assigned to it. The frequency of meningitis is decreasing because of vaccination against tuberculosis with BCG, a practice which has been systematically carried out in all regions since 1954. The effectiveness of the vaccine is clearly proved by the fact that only 4.5% of the children with meningitis had been vaccinated and that 95.5% had not been vaccinated. Vaccination reduced the number of cases of meningitis among infants under 2 years of age from one-third to one-fifth of the total number of cases. The mortality rate for all ages fell during the 3-year period from 42 to 18%. The authors attribute this decrease to the standardization of treatment throughout the republic. The essential medicament is isoniazid which is given orally in a daily dose of 15 to 20 mg. per kilogram of body weight for at least 6 months; after that the child is given 5 mg. per kilogram daily until he leaves the sanatorium. Streptomycin and aminosalicylic acid are also administered. Hormone therapy is given during the first 10 days of treatment. Earlier diagnosis and treatment resulted in a reduction in the number of children having coma or obnubilation at the beginning of treatment from 47 to 34%. Improvement in treatment increased the number of cures without serious sequelae from 48% in 1954 to 72% in 1956.

An Evaluation of Tuberculosis Case Finding by Tuberculin Testing and Some Observations of Histoplasmin Sensitivity Among Young School Children. L. E. Wood, M. L. Furcolow and M. J. Willis. Am. Rev. Tuberc. **78**:667-681 (Nov.) 1958 [New York].

The authors performed 66,033 tuberculin and histoplasmin skin tests annually with particular reference to the annual prevalence rates for tuberculin and histoplasmin sensitivity, as well as conversion rates for these antigens, among 51,040 kindergarten children in Kansas City, Mo., between 1947 and 1957. Of the 66,033 children, 35,995 were tested for the first time in kindergarten, and 15,045 received their first test while in the first grade and were not retested; 14,993 kindergarten children whose first skin tests were negative were retested the following year. A child whose skin test was negative one year and positive the next year was classified as a converter. The tuberculin employed in this study was purified protein derivative. The histoplasmin used was Lot H 42 in a 1:100 dilution. All tests were administered intracutaneously.

Of the 35,995 kindergarten children tested, 29,632 were white children and 6,363 were Negroes. Concerning the over-all tuberculin sensitivity rates, Negroes predominated over whites in a ratio of 2.6 to 1.5%. In contrast, the histoplasmin sensitivity rates were higher for white children than for Negroes, the ratio being 10.4 to 8.7; however, subsequent annual rates for white children showed a decrease, while those for Negroes increased, so that for the final 2 years of observation they were almost the same. Of the 14,993 children whose tuberculin tests were negative in the kindergarten and who were retested one year later in the first grade, 12,253 were white children and 2,740 were Negroes. Again, the percentage of tuberculin converters was higher among Negroes than among whites, the ratio being 1.4 to 1.0%. The histoplasmin conversion rates too were higher among the Negro children, the percentage for Negroes being 4.7% and for white children 2.6%. The tuberculin conversion rates observed among children who were nonreactors in kindergarten did not show a tendency to fall during the entire observation period.

The data concerning the yield of tuberculosis among the contacts of 155 tuberculin converters and 833 children who were reactors on the first

test in both white and Negro contacts (adults and children) show that an average of about 6 contacts for each converter and 4½ for each child who was a tuberculin reactor on the first test were followed. The average yield of new active, previously unknown cases of tuberculosis (1.2%) was the same for the converters as for those who were reactors on the first test. The yield of known tuberculosis among the contacts of children who were tuberculin reactors at the time of entrance to kindergarten was almost twice that of the converters (4.1 to 2.3%). The number of new active cases of tuberculosis was a little higher among contacts of Negro children than among those of white children; however, the yield of known tuberculosis among the Negroes was almost twice that of the yield among the whites. The increase in new, previously unknown cases of tuberculosis was almost twice as high among household contacts as among nonhousehold contacts (1.4 to 0.8%); however, known tuberculosis was found to be much more prevalent among nonhousehold contacts (5.4%) than among household contacts (2.7%). The yield of tuberculosis among contacts rose steadily as the size of the reaction of the index child increased. Thirty times as much new tuberculosis was found among contacts of children whose tuberculin reaction exceeded 25-mm. induration as among those whose reaction was 5 to 9 mm.

This survey revealed that the percentage of children infected with tubercle bacilli at the time of school entrance is the same now as it was 10 years ago. These relatively constant annual prevalence and conversion rates for tuberculin sensitivity should represent a reasonably accurate index of tuberculosis control within the city. Use of the tuberculin test for obtaining index children, whose contacts form a special risk group for extensive follow-up study, not only gives a better yield of tuberculosis cases than mass roentgenography but also at the same time decreases the total exposure of a population to ionizing radiation.

Accidental Home Poisonings. D. Kubryk and A. C. McKenzie. Canad. J. Pub. Health **49**:420-424 (Oct.) 1958 [Toronto].

The authors carried out an epidemiologic study of 275 accidental home poisonings which occurred in the area of Ottawa between 1956 and 1958. Of the 275 accidents, 259 occurred in children (151 boys and 108 girls) less than 5 years old. Of the remaining 16 accidents, 7 occurred in children between the ages of 5 and 10 years, and 9 occurred in children over 10 years of age. Of the 275 patients, 31% spent one day or more in the hospital; 13 of these were hospitalized for 10 days or more. Acetylsalicylic acid tablets were the commonest single substance responsible for these accidents, with household preparations and solvents next in order. Carelessness was considered to be a factor in 83% of the poisonings, and 90% of the poisonings were considered preventable. Little can be done about the inherent curiosity of young children, but the evidence seems to indicate that continued education directed to the parents of such children would greatly reduce the number of these accidental home poisonings.

Sensitivity to Tuberculin, Histoplasmin and Coccidioidin Among High School Students in Northwestern Georgia. P. Q. Edwards, C. F. Jacobs and D. Barfield. Dis. Chest **34**:467-483 (Nov.) 1958 [Chicago].

The authors report the results of a skin-testing survey with histoplasmin, coccidioidin, and tuberculin, supplemented with 70-mm. photofluorograms of the chest, which was carried out by the Public Health Service among students attending the 6 public high schools in Whitfield and Murray counties, Georgia. About 90% of the total estimated enrollment of 2,400 students participated in the survey. There was a striking reversal of the usual rural-urban pattern of prevalence of sensitivity to histoplasmin. Students living in the urban area of Dalton had a reaction rate of 55%, as compared with a rate of 22% for those living in rural areas. Pulmonary calcifications were observed in about 12% of the histoplasmin reactors. Analysis of the findings has led directly to the hypothesis that there may be a source of histoplasmal infection within the city of Dalton which has been present for at least several years.

About 5% of the white students had reactions interpreted as positive to the 5 T. U. (0.0001 mg.) dose of purified protein derivative of tuberculin, with only small variations of that average from school to school and between boys and girls. The rates were slightly higher for the older students, as compared with those for the younger students, within the 6-year age span from 14 to 19 years. Coccidioidin reactions, which were of small average size, were interpreted as nonspecific (or cross) reactions owing to histoplasmal infection.

Clearly histoplasmosis is an infection to be reckoned with in this urban community. Abnormalities in the chest roentgenograms of these young persons are far more often a result of histoplasmal than tuberculous infection. As an immediate consequence of the survey, a systematic search has been started through the health department's tuberculosis case register for persons with histoplasmosis misdiagnosed as tuberculosis. Skin testing with histoplasmin as well as tuberculin has been instituted in the clinic work. Tuberculosis is still the main problem, but the frequency of tuberculin reactors among these high school students indicates that the infection rate at the present time may be considered lower than 3 per 1,000 per year.

BOOK REVIEWS

The Amphetamines: Their Actions and Uses. By Chauncey D. Leake, Ph.D., Professor of Pharmacology, Ohio State University, Columbus. Publication number 338, American Lecture Series; monograph in Bannerstone Division of American Lectures in Pharmacology. Edited by Chauncey D. Leake. Cloth. $4.50. Pp. 167. Charles C Thomas, Publisher, 301-327 E. Lawrence Ave., Springfield, Ill.; Blackwell Scientific Publications, Ltd., 24-25 Broad St., Oxford, England; Ryerson Press, 299 Queen St., W., Toronto 2B, Canada, 1958.

This is an interesting, expertly written summary of the significant biological and chemical aspects of the amphetamines. Special emphasis is given to the three members of this group most widely used in medical practice: amphetamine sulfate, dextroamphetamine sulfate, and methamphetamine hydrochloride. The book is designed chiefly for use by practicing physicians, but it should also aid others associated even indirectly with the medical profession. In a touching dedicatory preface Dr. Leake pays well-deserved tribute to Dr. Gordon Alles who synthesized amphetamine in 1927 and made the original pharmacological studies on it. There are chapters on the history, source, and physical properties of the amphetamines; their absorption, fate, and excretion; their pharmacology and toxicology; their therapeutic applications (this is the subject of the longest chapter); and the sociological impact of their use and abuse. While about 300 references are listed, the book does not purport to be a detailed review. It is satisfactorily indexed and is written for quick and pleasant reading. This book is recommended to all physicians and to any others who wish to know the current status of this important group of drugs.

The Medical Management of Cancer. By Henry D. Diamond, M.D., F.A.C.P., Associate Attending Physician, Medical Neoplasia Service of Department of Medicine, Memorial Center for Cancer and Allied Diseases, New York City. Modern medical monographs 15. Editor in chief: Irving S. Wright. Consulting editor: Richard H. Orr. Cloth. $6.75. Pp. 179, with illustrations. Grune & Stratton, Inc., 381 Fourth Ave., New York 16; 99 Great Russell St., London, W. C. 1, England, 1958.

This small volume contains a wealth of information for the practicing physician, representing the distillation of some 12 years of the author's experience on the medical service of the Memorial Center for Cancer and Allied Diseases in New York. Combined with this has been his complementary function as an associate of the Sloan-Kettering Institute of the Center, where he is responsible for developmental work in chemotherapy of the lymphomas. His experience as investigator and clinician combined with an admirable knowledge of the natural history of cancer is reflected in the pages of this monograph. The author has achieved his announced objective of maintaining brevity without sacrifice of precision. The few omissions which are apparent are so lacking in importance as to underscore the author's total success. The content is outstanding but the organization of the book is defective in some respects. This is most apparent when, with no general discussion or orientation concerning features which are common to most or all of the forms of cancer under discussion, the author immediately launches into a discussion of the malignant lymphomas. Thus the first and in some cases the only description of such factors as surgical considerations, irradiation, and tabulation of the various polyfunctional alkylating compounds appears to be the peculiar property of the chapter on malignant lymphomas. This failure to provide a preliminary consideration of such factors and their general use is compensated for, to some extent, by the uniform treatment of each entity throughout the book, including etiology and incidence, pathology and natural history, diagnostic and pathological physiology, and treatment.

There are many effective and varied illustrations which include structural identifications of the various compounds listed as chemotherapeutic agents. Just as the sections on the background and development of each disease are lucid, the discussion of treatment is extremely practical, with special listing of the many facets of involvement and their need for recognition and management, as, for example, in Hodgkin's disease. The book is divided into two main groupings of the diseases discussed. More than half of the volume is devoted to the malignant lymphomas, the leukemias, and plasma cell myeloma, all cancers in which the primary treatment is medical. The remainder of the book is concerned with medical management of cancers in which the primary treatment is surgical, these neoplasms including neuroblastoma and cancer of the lung, thyroid, ovary, breast, and prostate. Under cancer of the breast, somewhat unjustifiable prominence seems to be ascribed to the use of androgens at the expense of oophorectomy for premenopausal women. The format of the book is excellent. At the end of each chapter there is a well-chosen list of references. A useful appendix discusses the intracavitary injection of radioisotopes, with an impressive bibliography. This volume should be of the greatest value to anyone who treats patients with incurable cancer, be he senior medical student, intern, general practitioner, or specialist.

These book reviews have been prepared by competent authorities but do not represent the opinions of any medical or other organization unless specifically so stated.

The Teaching and Learning of Psychotherapy. By Rudolf Ekstein, Ph.D., and Robert S. Wallerstein, M.D. Cloth. $6.50. Pp. 334. Basic Books, Inc., 59 Fourth Ave., New York 3, 1958.

The authors have tackled the elucidation of the difficult problems of training in psychotherapy. No satisfactory model for supervision has yet been universally acclaimed in the many existent training centers for psychiatrists, social workers, or psychologists who are learning the processes of psychotherapy. The problems involved are represented by a clinical rhombus which involves the administrators, the supervisors, the therapists, and the patients. The authors attempt to understand the various interactions among these four foci of persons involved in learning and teaching. Under four main headings, entitled (1) The Training Setting; (2) The Beginning Phase; (3) The Learning Process; and (4) The End Phase, various problems of interaction between teacher and student are thoroughly considered. Each section includes examples taken from real situations as experienced by the authors. Their examples are lucid and clearly expose the many problems involved in teaching and learning psychotherapy. All psychiatrists who are naturally involved either as administrators, therapists, or supervisors will find much in this book that attempts to clarify the many doubts raised in these various roles. However, the book does not attempt to cover the problems of technique and, therefore, does not teach psychotherapy. This is a slow and tedious process which must be experienced over long periods of time by the various learners in this field. Neither does the book undertake to teach supervision, which also requires a lengthy learning process. There is an excellent bibliography and a satisfactory index. The book is highly recommended for use in the various training centers.

The Borderland of Embryology and Pathology. By R. A. Willis, D.Sc., M.D., F.R.C.P. Cloth. $18. Pp. 627; 33, with 244 illustrations. Butterworth & Co. (Publishers) Ltd., 88 Kingsway, London, W. C. 2, England; 1367 Danforth Ave., Toronto 6, Canada, 1958.

Those who have felt concern over the increasing pressures to dispense with comparative anatomy and embryology as requirements for admission to medical school will find no comfort in this book. For over 600 pages the author documents various problems in medicine which are explained at least in part by an understanding of embryology. The author assumes only a modest knowledge of embryology on the part of the reader and devotes the opening chapters to a description of the early development of the human embryo and the structure and function of embryonic tissues as well as some of the more recent contributions of experimental embryology. He then discusses malformations, indicating the importance of developmental arrest and differential susceptibility in the various types. Both environmental and genetic causes are considered before showing the relations of malformations to various clinical conditions, many of which are not commonly realized to have an embryonic basis, such as neurofibromatosis, muscular dystrophies, and tuberous sclerosis. Many congenital anomalies are explained by developmental vestiges or developmentally heterotopic tissues and, since these conditions are familiar to the clinician, they are covered rather quickly in this volume. In the chapter entitled "Hamartomas and Hamartomatous Syndromes" the author emphasizes the pathology of the conditions with little reference to a possible embryologic explanation. Inborn metabolic disorders are treated cursorily but are supported by an extensive and current bibliography. The discussion of embryonic tumors and teratomas is excellent, as might be expected; for it is in this sphere that much of Dr. Willis' earlier work was done. His discussion of embryonic tumors from an embryologic and histogenetic basis should do much to clarify the confused ideas that many have regarding these tumors.

A discussion of non-neoplastic diseases of the fetus, such as viral, bacterial, nutritional, or endocrine diseases and the effects of drugs or poisons, emphasizes the importance of maternal conditions in modifying fetal development and causing disease in the fetus. The volume concludes with a discussion of regeneration and repair as a function of resumed embryonic growth and a chapter on metaplasia. A short chapter on transplantation and tissue culture appears to have been added somewhat as an afterthought. While this is a survey of the field of tissue culture, it does not add appreciably to the value of the book. It is fortunate that one of the world's most outstanding pathologists should have written a volume on one of medicine's most challenging problems, the control and repair of congenital defects. There can be no question of Dr. Willis' competence to write such a volume. This book can be unhesitatingly recommended to pediatricians, surgeons, pathologists, and anyone with an interest in congenital anomalies.

The Practical Use of the Microscope Including Photomicrography. By George Herbert Needham, M.S., F.R.M.S., Lecturer in Microscopy and Photomicrography, University of California Medical School, University Extension, San Francisco. Cloth. $15.50. Pp. 493, with 173 illustrations. Charles C Thomas, Publisher, 301-327 E. Lawrence Ave., Springfield, Ill.; Blackwell Scientific Publications, Ltd., 24-25 Broad St., Oxford, England; Ryerson Press, 299 Queen St., W., Toronto 2B, Canada, 1958.

The title of this volume gives an accurate description of its content, since the author has succeeded in making this book on microscopes practical from the standpoint of both the proper use of the various instruments on the market and their limitations. Constructive criticisms of instruments and their

limitations is desirable in any publication describing different types of equipment, provided it is done impartially and adequately. The author has organized the book to start with the simple and proceed to the complex aspects of the subject so that it may be of value to the beginner as well as to the more advanced reader. A brief introduction on the evolution of the microscope is followed by 11 chapters on the various classes or types of microscopes. These include simple and compound microscopes, binocular and wide field binocular microscopes, comparison, fluorescence, electron, phase contrast, and polarizing microscopes, near ultraviolet, ultraviolet, and reflecting microscopes, and slit, immersion, and reflecting ultramicroscopes. In these chapters the author has usually included a general discussion of the basic instrument, the manner in which the instrument is to be used, the field of usefulness, the advantages and disadvantages of the instrument, and a discussion of the various makes of instruments available.

The chapter after the one on polarizing microscopes includes material on the determination of optical constants of crystalline materials. The optics of the microscope are discussed in a single chapter followed by individual chapters on microscope components and items and techniques necessary for the proper use of the microscope. Included in these chapters are such subjects as objectives, eyepieces, substage condensers for transmitted light, refracting and reflecting condensers, illumination and illuminating devices, light filters and cells, measuring devices, and mounting mediums for specimens. There is also a chapter on photomicrography. In addition the book contains an adequate index, a glossary of terms used in microscopy, and an appendix which contains a few mathematical tables, a listing of microscopical societies, sources for purchasing microscopes and their parts as well as mounting mediums and specimens. The book is highly recommended for all persons who are interested in microscopes but especially for those who use them, supervise their use, or are responsible for their purchase.

Convulsive Disorders of Children. By Dora Hsi-Chih Chao, M.D., Physician and Assistant Director, Blue Bird Clinic, Methodist Hospital, Houston, Ralph Druckman, M.D., Neurologist, Blue Bird Clinic, and Peter Kellaway, A.M., Ph.D., Director, Blue Bird Clinic. Cloth. $6. Pp. 151, with 25 illustrations. W. B. Saunders Company, 218 W. Washington Sq., Philadelphia 5; 7 Grape St., Shaftesbury Ave., London, W. C. 2, England, 1958.

This book has been expanded from a manual which the authors originally prepared for the use of residents. It is a concise description of the problem of epilepsy in children from the clinical viewpoint. The first half of the book is taken up with practical classification and description of each of the various types of epilepsy, well documented with illustrative case reports and electroencephalogram tracings. The second half discusses seizures of other types, due to other causes, which must be considered in the differential diagnosis of epilepsy. There are short chapters on convulsive "equivalent" seizures, benign febrile convulsions, breath-holding attacks, and extracerebral causes of convulsions. There is also a chapter dealing with epilepsy in adults. From a practical viewpoint the chapters on the investigation and diagnosis of a patient with seizures and on the management of seizures are most valuable. For those unfamiliar with EEG's, the chapter describing this technique and its interpretation in epilepsy is straightforward, simple, and understandable. The book ends with a table giving the indications, dosages, and toxic effects of the various drugs used. This is an excellent handbook on epilepsy for interns, residents, general practitioners, and pediatricians who are faced with the everyday problem of diagnosis and treatment of the patient with seizures. It is not intended to describe original or basic studies but does supply a short bibliography for the more sophisticated reader. It is well written, well documented, and soundly based clinically. The information given on drug therapy is up to date, sensible, and easy to find.

Ciba Foundation Symposium on the Cerebrospinal Fluid: Production, Circulation and Absorption. Editors for Ciba Foundation: G. E. W. Wolstenholme, O.B.E., M.A., M.B., and Cecelia M. O'Connor, B.Sc. Cloth. $9. Pp. 335, with 141 illustrations. Little, Brown & Company, 34 Beacon St., Boston 6; J. & A. Churchill, Ltd., 104 Gloucester Place, Portman Sq., London, W. 1, England, 1958.

This book presents the contributions of an exceptionally productive and articulate group of investigators to the many anatomic, physiological, and biochemical problems relating to the fluid that fills the ventricular and subarachnoid systems of the brain and spinal cord. The first 10 papers deal with fundamental problems of development, secretion, and diffusion. These papers and the discussions that follow each reveal at once the ingenuity of modern techniques and the puzzling nature of the results. The following five chapters deal with many urgent practical problems, such as hydrocephalus and spinal anesthesia, and the last chapter is a general discussion. Careful editing of the discussions has made them coherent and interesting, in welcome contrast to the confusing presentations that have been published occasionally in the past. The index is another welcome feature, and there are many instructive illustrations. While a frank disclosure of an unsatisfactory state of knowledge of particular fields of science is desirable, this book encourages the reader to wish for something further. Might it not be good discipline for the participants if, after their critical appraisal of methods, they met in a workshop session and endeavored to formulate

statements of established results? A concluding chapter of this sort should win the gratitude of busy practitioners and harried medical students everywhere.

The Eye: A Clinical and Basic Science Book. By E. Howard Bedrossian, B.S., M.D., M.Sc. (Med.), Assistant Professor of Ophthalmology in Graduate School of Medicine of University of Pennsylvania, Philadelphia. With foreword by Edmund B. Spaeth, M.D. Cloth. $11. Pp. 340, with illustrations. Charles C Thomas, Publisher, 301-327 E. Lawrence Ave., Springfield, Ill.; Blackwell Scientific Publications, Ltd., 24-25 Broad St., Oxford, England; Ryerson Press, 299 Queen St., W., Toronto 2B, Canada, 1958.

This new book is for the most part a condensation of useful information on clinical ophthalmology and on the basic sciences. It makes no claim to be a complete textbook and much of it is arranged in outline form. The portion dealing with the basic sciences of anatomy, pathology, physiology, biochemistry, and optics serves as an excellent survey of these fields for the ophthalmology resident, especially as a review in preparation for the Board examinations. The clinical portion is too abbreviated for it to be of value as a reference or a textbook for the undergraduate student, but its very terseness may be of some value for those seeking a rapid review of the field. The final chapter on ocular emergencies might be read with profit by every student and general physician. While there are many fine illustrations the book could be further improved by the use of additional photographs and diagrams. By an original method of presentation the author, although he has not produced another May or Gifford-Adler, has contributed a book with a limited but nevertheless important place in ophthalmologic literature.

Surgery of the Head and Neck. By Robert A. Wise, M.D., Associate Clinical Professor of Surgery, University of Oregon Medical School, Portland, and Harvey W. Baker, M.D., Clinical Instructor in Surgery, University of Oregon Medical School. Handbook of operative surgery. Cloth. $9.75, Pp. 319, with 82 illustrations by Jessie W. Phillips. Year Book Publishers, Inc., 200 E. Illinois St., Chicago 11, 1958.

This small but well-written volume adds notably to the series of handbooks of operative surgery. The line drawings by Jessie W. Phillips are clear and effectively complement the text. In addition to outlining the standard operative procedures on the head and neck, many worthwhile features of examination, preoperative and postoperative care, anesthesia, and operative complications peculiar to this anatomic region are presented. The radical approach to lesions of the head and neck depicted in this volume represents the only rational method of obtaining reasonable results in long-followed cases. The only criticisms concern the site of division of the prethyroid muscles in plate 57 and the placement of the vertical portion of the incision for neck dissection, in plate 71. The strap muscles of the thyroid region should be divided at a higher level than shown in the plate, and the vertical portion of the neck dissection incision should be placed further posteriorly in order to avoid marginal necrosis over the carotid artery and its branches. This edition is recommended for all residents who wish to study operative techniques of the head and neck area and surgeons who treat diseases in this region.

The Clinical Examination of the Nervous System. By G. H. Monrad-Krohn, M.D., F.R.C.P. With assistance of Sigvald Refsum, M.D., Professor of Medicine (Neurology) in University of Oslo, Oslo, Norway. Eleventh edition. Cloth. $9.50. Pp. 466, with 173 illustrations. Paul B. Hoeber, Inc. (medical book department of Harper & Brothers), 49 E. 33rd St., New York 16; H. K. Lewis & Co., Ltd., 136 Gower St., London, W. C. 1, England, 1958.

This book follows the pattern established in its first edition (1921) and maintains the same standards. It is written from the clinic for the clinic and is based largely on personal experience. Certain sections have been curtailed in the new printing and others expanded. The chapter on associated or synkinetic movements is expanded, the examination of aphasia enlarged to cover the method used in the author's hospital, and newer tests for myasthenia gravis added. Monrad-Krohn now having retired from the chair of neurology in the University of Oslo, the book has been revised with the assistance of his successor, Sigvald Refsum. As a result of full revision the present edition is virtually a new book. There are a few minor typographical errors, not of sufficient quantity to detract seriously from the value of this excellent book.

Clinical Epidemiology. By John R. Paul, M.D., ScD., Professor of Preventive Medicine, Yale University School of Medicine, New Haven, Conn. Scientist's Library, Biology and Medicine. Edited by Peter P. H. De Bruyn, M.D. Cloth. $5. Pp. 291, with 37 illustrations. University of Chicago Press, 5750 Ellis Ave., Chicago 37. Cambridge University Press, Bentley House, 200 Euston Rd., London, N. W. 1, England; University of Toronto Press, Toronto 5, Canada, 1958.

The author, who is a well-known authority in the field of epidemiology, has made a fine contribution in presenting in a most succinct and concise manner a modern approach to his subject. This book should be considered a requisite not only for public health career personnel but also for every practicing physician. It conveys a most modern, practical definition of epidemiology that may be used effectively throughout the world. Of special interest is the chapter entitled, "The Environment: Microclimate," in which the "social climates" of various peoples and lands are discussed. Arriving at accurate conclusions by this approach requires great understanding and resourcefulness. Also, the author's description of the history of epidemiology and of proper epidemiologic philosophy gives greater understanding and impetus for further progress in this field.

QUESTIONS AND ANSWERS

SYSTEMIC REACTIONS TO FOREIGN SERUM

To the Editor:—*Please give advice on the best procedures in the following problems: First, a patient has a soil-contaminated sealed wound and is therefore subject to tetanus antitoxin therapy. Immediately after being given a skin test with 1:10 to 1:10,000 dilution of horse and bovine serums, the patient shows a mild or severe systemic reaction or a huge skin reaction. Another patient with the same type of injury shows a mild skin test reaction (wheal, 0.5 cm.; erythema, 1 cm.). When the accepted method of desensitization is carried out, with dosage started as that dilution which fails to produce a skin reaction and increased by 50% at 20-minute intervals, the patient exhibits the symptoms of systemic reaction, namely, hives, wheeze, hypotension, and shock.*

Second, a patient is bitten on the nose by a stray dog and thus requires hyperimmune rabies serum. Skin tests with 1:100 dilutions of horse and sheep serums both result in a huge immediate local reaction, each test having a negative control. Epinephrine, antihistamines, and steroids help to relieve the symptoms of the serum reactions, but, as far as is known, they cannot prevent them. As an alternative to serum therapy in these cases, should tetanus toxoid and rabies vaccine be used, in spite of the danger during the period it takes to develop immunity? On the other hand, should attempts at serum desensitization be continued, with 10^{-6} to 10^{-9} dilutions of serums used, even if it will take days to complete the series and the patient will thus be exposed to possible fatal consequence?

M.D., California.

Answer.—Neither a positive nor a negative skin test is an absolute index as to the type of systemic reaction which a patient may develop after administration of a foreign serum. An ophthalmic test is less sensitive but is considered to be more reliable for the determination of sensitivity. This is carried out by placing a drop of 1:10 solution of horse serum in the lower conjunctival sac. A positive reaction is indicated by itching, burning, redness, and lacrimation within 10 to 30 minutes. This reaction can be controlled by instillation of a drop or two of epinephrine solution, 1:1,000. In spite of the apparent greater reliability of this test, deaths due to anaphylaxis after the administration of horse serum in which the conjunctival test was negative have also been reported. In view of the fact that neither the skin test nor the ophthalmic test is completely dependable, administration of immune serum must always be carried out with extreme caution, with certain criteria in mind: 1. It is most hazardous to administer serum to patients with a strongly positive findings in the conjunctival test. 2. It is less dangerous if a negative reaction to the ophthalmic test and a positive reaction to the skin test are present or if both tests yield doubtful results. 3. In instances such as in the first problem presented, when the patient shows a "huge skin reaction," two types of procedure may be followed. First, the intravenous administration of serum may be done. It has been found in many instances that intravenous administration has failed to produce constitutional symptoms. One method is to fill an infusion flask with 100 cc. of a 1:1,000 dilution of the immune serum in isotonic sodium chloride solution. About one hour is allowed for the introduction of this amount, which corresponds to 0.1 cc. of undiluted serum. After this, the patient is given 100 cc. of a 1:100 solution at the same rate. This corresponds to 1 cc. of undiluted serum. Then the undiluted serum is injected with a syringe into the rubber tube at intervals of 10 to 15 minutes, in accordance with this schedule: 0.2 cc., 0.4 cc., 0.8 cc., 3.2 cc., 6.4 cc., and 12.8 cc. Subsequently, the entire amount may be given. Second, in the markedly sensitive patients, another method is to administer 0.1 cc. of epinephrine mixed with each subcutaneous injection of serum. The serum should be given by deep subcutaneous injection once every 20 minutes. One should begin with 0.05 cc. of a 1:10 dilution, followed by 0.1 cc., 0.3 cc., and 0.7 cc. If that is tolerated, then the undiluted serum may be given in doses of 0.1 cc., 0.5 cc., and 0.7 cc. at 20-minute intervals. If untoward symptoms develop at any stage, the administration of serum should be stopped and 1 cc. of epinephrine should be injected intramuscularly. In instances of alarming reactions, it may be necessary to give 0.05 to 0.1 cc. of epinephrine solution intravenously. After the allergic manifestations have completely subsided, the injections of serum may be resumed, beginning with a dose equivalent to one-half or less of the previously tolerated dose. In regard to the "mild skin reaction," desensitization may be attempted either intravenously or in the following manner: The initial dose should be no greater than 0.1 cc. of a 1:100,000

The answers here published have been prepared by competent authorities. They do not, however, represent the opinions of any medical or other organization unless specifically so stated in the reply. Anonymous communications cannot be answered. Every letter must contain the writer's name and address, but these will be omitted on request.

dilution of the antitoxin administered subcutaneously. Increasing amounts, usually double the preceding dose, are given every 10 to 20 minutes, if no reactions occur, until the required amount has been administered. Under any circumstances, no serum should ever be administered unless a syringe with a 1:1,000 epinephrine solution is at hand.

In respect to the second problem, dealing with prophylaxis against rabies in a patient sensitive to horse and sheep serum, a rabies vaccine, the so-called dried killed virus vaccine, may be used. This vaccine is a suspension of embryonic duck tissue infected with fixed rabies virus prepared according to the Powell-Culbertson method. The treatment for the prevention of rabies in exposed subjects consists of daily subcutaneous injections of this vaccine for 14 days. Caution must be used in administering the vaccine to persons with a history of allergy, especially to egg.

ANSWER.—The use of antitoxin is too dangerous in the treatment of a patient exposed to tetanus. The reason for this is not the positive skin reaction but the systemic reactions elicited by small doses of serum (presumably of both horse and bovine serum). The use of tetanus toxoid suggested by the inquirer is important only for future protection, not for the present danger. The advice in this case is to administer large doses of antibiotics. The tetracycline types are recommended by some (A Textbook of Medicine, ed. 9, edited by Cecil and others, Philadelphia, W. B. Saunders Company, 1955). Penicillin, aureomycin, and terramycin were found experimentally to be effective against Clostridium tetani–infected mice (Taylor and Novak, *Antibiotics & Chemother.* **2**:517, 1952). Whether débridement of the wound and exposing it to the air should likewise be done would depend on the nature and site of the sealed wound.

The second question, involving the bite of a stray dog, is less clearly stated. It is assumed that thorough search for the dog has been in vain. The inquirer speaks of a large skin reaction to horse and sheep serum. This is a warning for extreme caution in the use of such serum. It is not an absolute contraindication against its careful use in the presence of clear danger of rabies. Large skin reactions are not always precursors of systemic reactions. In a recent review, Habel (*Pediatrics* **19**:923, 1957) advises that, if antirabies serum is used, a large dose (0.5 ml. per kilogram of body weight) should be given intramuscularly followed by injection of antirabies vaccine. In this case it seems advisable to inject subcutaneously into the distal anterior part of the thigh or, preferably, in the lower part of the forearm with a tourniquet in place ready to be tightened immediately if a systemic reaction begins. The dose of antiserum should be divided into small portions to be given at hourly intervals. At the onset of a systemic reaction, the tourniquet is tightened to shut off circulation. Simultaneously, epinephrine is given into the opposite arm by an assistant. Release of the tourniquet for brief intervals every 20 minutes will permit slowing of the reaction, with epinephrine used around the site of the injection and, if necessary, above the tourniquet to control additional reactions. Of course, if a systemic reaction occurs no additional serum should be used. Antirabies vaccine injections (at least 14 doses) should be administered whether the antiserum is given or its administration is contraindicated because of a systemic reaction.

ABSORPTION OF EXTRAVASATED BLOOD

TO THE EDITOR:—*A 54-year-old woman experienced generalized oozing from the operative site for two weeks after a hysterectomy. At autopsy, the patient was found to have had generalized jaundice, bile nephrosis, hemoperitoneum, and liver damage. During her hospital course, the patient received 12 pints of blood. Transfusion reaction due to isoimmunization does not appear to be a factor. Is the extravasated blood absorbed, and what is the effect on the icteric index?*

M.D., Indiana.

ANSWER.—When large amounts of blood are extravasated into any body cavity, a certain amount of absorption does occur. There is evidence that blood is absorbed at not too slow a rate from the peritoneal cavity, and this has been proposed as a method of transfusion where veins are not accessible. As a certain amount of this blood is already destroyed prior to absorption and the hemoglobin molecule may well begin to break down before it passes the peritoneal barrier, there will be a rise in the icteric index to levels somewhat above normal. However, the absorbed red blood cells are probably already damaged and will be rapidly destroyed, also leading to hyperbilirubinemia insufficient, however, to produce clinically severe jaundice. It is of extreme importance to know how rapidly these 12 pints of blood were given and what effect this had on the oozing. The syndrome of bile nephrosis is not a well understood one and is usually seen only when there has been long-standing liver disease with obstructive jaundice. Hypoprothrombinemia and factor VII deficiency are frequent complications of liver disease. The extent of the deficiencies of prothrombin and factor VII are poorly correlated with the severity of the disease. However, severe hepatic failure usually presents the most severe prothrombin complex deficiencies. Minimal damage, as represented by findings in other liver function tests, may demonstrate rather severe prothrombin and factor VII deficiency. An associated factor that may be present in this case is a deficiency of prothrombin due to

an inability to absorb or utilize vitamin K. One would have to know the extent of the antibiotic therapy prior to surgery in this patient, and if such were present this might account for a considerable degree of hypoprothrombinemia.

Given such a case with extensive oozing, a complete coagulation profile and adequate history for prior evidence of hemorrhagic diathesis should be available. The blood studies should include platelet count and bleeding time, prothrombin time, one of the adequate coagulation time determinations, such as the three-tube Lee-White, and serum prothrombin time determination. These tests are generally sufficient to pick up any abnormality in the coagulation mechanism. Occasionally, one is forced to do thromboplastin generation studies or cross-matching tests with known coagulation deficiencies. However, the latter two tests require the presence of laboratory workers well versed in the disturbances of bleeding and coagulation. Many good references are available for this work (Biggs and MacFarlane, Human Blood Coagulation and Its Disorders, Springfield, Ill., Charles C Thomas, Publisher, 1957; Quick, Hemorrhagic Diseases, ed. 2, Philadelphia, Lea & Febiger, 1957; Tocantins, Coagulation of Blood, New York, Grune & Stratton, Inc., 1955). As far as the survival of transfused blood is concerned, it is generally accepted that blood properly stored for no longer than 21 days has a red blood cell survival of approximately 100 days (Ashby survival time studies). Certainly in any hemorrhagic diathesis one is generally safer in giving fresh blood (no older than 24 hours). The syndrome of fibrin depletion is usually associated with major thoracic surgery or one of the obstetric complications, such as dead fetus syndrome or premature separation of the placenta. Occasionally, patients with malignancy, such as carcinoma of the prostate and leukemia, have also shown fibrinolytic diathesis and hypofibrinogenemia. In general, in the evaluation of any hemorrhagic diathesis the most important approach is that of proper history for hemorrhagic disturbance, in the patient prior to the present incident and in the patient's family. The vast majority of such situations are hereditary disorders. The acquired situations are such that one must seriously consider previous liver disease, cirrhosis, hepatitis, postnecrotic cirrhosis, and similar conditions and the complication of superimposed idiopathic or symptomatic acquired thrombocytopenic purpura. Occasional platelet depletion may be accomplished by massive transfusion of the blood, where the transfused blood has a very low level of platelets and a dilution factor occurs after the pouring of the blood into the patient's circulation. However, this should rapidly disappear within 24 to 36 hours.

TREATMENT OF SCARLET TONGUE

To the Editor:—*One patient in five who comes to this office manifests a scarlet tongue, without soreness. Gastrointestinal complaints are present, and some patients have systemic symptoms and findings. One woman in particular has a generalized dermatitis that resembles the color of the tongue. Histories reveal that these patients have taken broad-spectrum antibiotics, alcohol over a period of time, and large amounts of vitamin B or vitamin B complex; diabetes and other conditions have also been noted. The mostly likely diagnosis is moniliasis. What is the best treatment for generalized moniliasis? Amphotericin B has been recommended, but it has been noted that there are many side-effects and little improvement from the use of this agent. The incidence of this condition is increasing. Vitamins, calcium, nystatin, and several other agents have been used, to no avail.* *M.D., Arkansas.*

Answer.—There is no panacea for redness of the tongue and buccal mucosa. For monilial infection of the mouth, the most effective local remedy has been mouth washes, from four to six times a day, with nystatin vaginal tablet freshly dissolved in about 60 cc. of water. If Candida is present, there is a rapid response to this type of mouth wash within a few days. Patients in whom vitamin B complex has proved ineffective are sometimes benefited by large doses of vitamin A, particularly in the form of buccal tablets, 150,000 units each, dissolved in the mouth once daily, ostensibly to get the local effect of vitamin A on the buccal mucosa. From the description given, pellagra cannot be definitely eliminated as a possible cause.

Answer.—The causes of scarlet tongue are many and varied. Other than the many diseases associated with color changes on the tongue, such as scarlet fever, some of the anemias, and pellagra, food and drugs are often causative agents. The marked increase in the use of lipstick is also to be considered. It is fashionable today to use too much of vitamin B and its complexes. In this instance, a positive diagnosis of moniliasis should be confirmed. In these patients the suggested action would be to remove the cause if ascertainable. All medicaments should be withdrawn, and a high-protein, low-fat, low-carbohydrate diet should be given along with yogurt or lactobacilli preparations.

Answer.—It seems unlikely that these patients are suffering from generalized moniliasis. The clinical manifestations described have been observed in the absence of Candida and have been attributed to a temporary vitamin abnormality associated with the antibiotic-induced alteration in the bacterial flora of the intestinal tract. The findings usually disappear after the withdrawal of antibiotics,

though this may require some time. Generalized moniliasis usually affects severely debilitated patients who have been intensively treated with broad-spectrum antibiotics, adrenocortical steroids, or roentgen irradiation. In such instances, aspiration pneumonia or Candida septicemia may develop. Blood cultures should be obtained in an effort to demonstrate the typical creamy, yeast-like colonies which grow well on Sabouraud's medium. The treatment of choice for the generalized infection is parenterally given amphotericin B, which has been shown to be effective in clearing the blood stream of Candida organisms within a few days (Procknow and Loosli, *A. M. A. Arch. Int. Med.* **101**:765, 1958). Recommended dosage is 0.5 to 1.0 mg. per kilogram of body weight per day, to be given intravenously over a period of six hours. The duration of therapy has not been clearly defined, but a significant clinical response has occurred after four to eight weeks of treatment. Side-effects such as chills, fever, headache, nausea, and vomiting are common but are not so severe as to contraindicate use of the drug. Local mucocutaneous infections involving the mouth, pharynx, and lower gastrointestinal tract are much more common. A history of prolonged treatment with broad-spectrum antibiotics frequently can be elicited from such patients. Nystatin has proved to be most efficacious in the treatment of local infection. If the oropharynx is involved, nystatin should be used in suspension as a gargle every three to four hours. When it is thought that the entire gastrointestinal tract is involved, tablets containing 500,000 units of nystatin should be given four times daily. This type of treatment is directed at local infection, since significant blood levels of this drug cannot be achieved with oral therapy.

CALCIUM REQUIREMENT FOR ADULTS

To the Editor:—*What is the minimum daily calcium requirement for adults? Various textbooks indicate that, while the growing child and pregnant woman need large amounts of calcium, the normal healthy man or woman does not need to worry about it. However, would adults on milk-free diets because of allergy obtain sufficient calcium in an otherwise balanced diet? If not, how much supplementary calcium should they be given?*

M.D., California.

Answer.—According to the "Recommended Daily Allowances," as set forth by the National Research Council's Food and Nutrition Board, an adult should ingest 800 mg. of calcium per day. This figure was arrived at by calcium balance studies, which admittedly have their limitations. Apparently, many adults have the ability to attain equilibrium at widely different levels of calcium intake. Until such a time as there is more definitive evidence available, it would probably be well for an adult to aim at the level of 800 mg. of calcium per day. This can easily be obtained in the United States from dairy products. If milk is contraindicated, care should be taken to see that other sources of calcium, such as green, leafy vegetables, turnip greens, and broccoli, are included in the diet. It is recognized that the allowances of the Food and Nutrition Board are most certainly generous, and there are many who feel they are excessive.

The allowances for pregnancy and lactation are intended to provide for the growth of the fetus during the last trimester and for the production of milk. It should be emphasized that the recommended allowance for the last trimester of pregnancy presupposes that the woman was well nourished at the onset of pregnancy. Where there was previous undernutrition, the increase in calcium should be supplied earlier. The following table gives the recommended dietary allowances of calcium for adults and for pregnant and lactating women. If sufficient calcium cannot be obtained from the diet, it is, of course, necessary to give supplemental calcium.

Recommended Dietary Allowances of Calcium

	Age, Yr.	Calcium, Gm.
Men	25	0.8
Women	25	0.8
Pregnant (second half)		1.5
Lactating (850 ml. daily)		2.0

NONIRRITATING MATERIALS FOR PROSTHESIS

To the Editor:—*What malleable metals or plastics can be imbedded in human tissue without corroding or causing local irritation? Where can such materials be obtained?*

G. D. Gregory, M.D., Chicago Heights, Ill.

Answer.—Many surgical materials have been tested in the hope that one could be found which is not subject to corrosion and which produces no foreign body reaction. However, all have shown some foreign body reaction, and spectrographic analysis of the tissues which have been in contact with metals buried in the body usually shows the presence of an appreciable quantity of metallic ions in the tissues, indicating that some corrosion is going on. No metal or alloy has been absolutely resistant to corrosion when immersed in sea water. The same effect is exhibited by body fluids. There is, however, a great quantitative difference in the amount of corrosion and in the severity of the reaction to various metals and plastics. The 18-8-SMO stainless steels (type no. 316, 317), the nonferrous alloys, such as cobalt-chromium-molybdenum, and titanium (pure metal) show the least corrosion and the least foreign body reaction of the metals commercially available (Jergesen, Studies of Various Factors Influencing Internal Fixation as a Method of Treatment of Fractures of the Long

Bones, report to the National Research Council, Committee on Veterans Medical Problems, contract V1011 M-1945). Plastic materials show no corrosion, but hip prostheses made of acrylic and nylon have produced such severe foreign body reactions that their use for this purpose has been abandoned. Oppenheimer and co-workers (*S. Forum* **4**:672, 1953) showed that sarcomas can be produced in the experimental animal by implanted plastic materials. The conclusion seems inescapable that all prosthetic devices should be tested in the laboratory and in experimental animals before they are used in human beings. Efforts are being made to develop methods of testing and specifications for manufacture of devices to be used in the body. The legal as well as the medical implications have been pointed out (Report of the Joint Committee for the Study of Surgical Materials, *J. Bone & Joint Surg.* **36-A**:411, 1954).

ETIOLOGY OF HOMOSEXUALITY

To the Editor:—*What early life experiences contribute to the formation of homosexuality? What is the future for boys who like to play at girls' games and wear girls' clothing and for girls who do the opposite? What definitive studies have been made toward clarifying this etiology?*

Edward Dengrove, M.D., Asbury Park, N. J.

Answer.—Homosexual development is contributed to by life experiences that interfere with normal masculine identifications on the part of the boy and feminine identifications by the girl. The boy who is possessively enveloped by a controlling mother may identify with the mother; the boy who is passively indulged by a weak father may tend toward effeminacy and homosexuality. The essential normal requirement for the boy is association with a healthy masculine father, or father representative, who, through identification, serves as the model for the boy's conception of himself. The same holds true with respect to the necessity for exposure to a normally feminine and motherly mother for the girl. Boys who play at girls' games and wear girls' clothes are involved in feminine identification arising from a too close and dependent relationship with the mother or betray anxiety about assumption of a masculine role. This latter attitude may be a result of intimidation by an overwhelming father. Girls who dress and play as boys consciously or unconsciously depreciate feminity, attributing greater values to the masculine role; this evaluation is usually derived from basic attitudes of the parents toward boys and girls. Many boys go through brief and transient periods of interest in feminine clothing during prepuberal years; if such behavior persists it may indicate neurotic or characterological disturbance in development that calls for therapeutic intervention. Many girls go through a temporary phase of tomboy interest and behavior, with normal subsequent development. Again, degree and persistence over a period of time may indicate more serious developmental disturbance. Classic studies have been made by Freud (Collected Papers, vol. 2, London, Hogarth Press, 1925, chap. 18 and 19), Fenichel (*Internat. J. Psycho-Analysis* **2**:211), and Brown (*Am. J. Orthopsychiat.* **28**:424, 1958).

RED BLOOD CELL COUNT

To the Editor:—*What is the most accurate, rapid method of doing a red blood cell count?*

N. W. Erickson, M.D., Beaver Dam, Wis.

Answer.—The most accurate method for determining the number of erythrocytes of the blood is the well-known standard method of direct counting in a hemocytometer under a microscope. Several instruments are now available, in which light is passed through a dilute suspension of erythrocytes. One such instrument is the Coulter counter, which gives a rapid and accurate erythrocyte count.

EXCESSIVE SALIVATION IN PARKINSONISM

To the Editor:—*In* The Journal, *Sept. 6, 1958, page 138, it was asked whether anything can be used to check the excessive salivation which occurs in patients with paralysis agitans. The consultant indicated that there is no effective drug for this condition. I should like to call attention to the report by Dr. Kate Constable and myself* (J. A. M. A. **163**:*1352-1357 [April 13] 1957*)*; table 2 shows a 100% improvement of sialorrhea and drooling after the use of orphenadrine (Disipal), and the second case report describes a woman who refrained from making breakfast for her husband for fear the drooling of saliva might contaminate her husband's food but, after 3 tablets of orphenadrine a day, this problem was completely solved. I would recommend this drug to a physician who finds it difficult to control sialorrhea and drooling in such a patient. It is one of the safest drugs to use.*

Lewis J. Doshay, M.D.
710 W. 168th St.
New York 32.

The above comment was referred to the consultant who answered the original question, and his reply follows.—Ed.

To the Editor:—*In the interests of truth, the action of orphenadrine in this connection should be made known. This consultant's experience with orphenadrine in patients with paralysis agitans in general but not with salivation has been disappointing. However, one of its beneficial side-reactions may have been overlooked in attempting to determine its over-all value.*